ARCHITECTURAL SITE INTIMACY

NURTURING THE RELATIONSHIP

BETWEEN ARCHITECTURE, HUMANS AND LAND

A DARCH PROJECT SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAIʻI AT MĀNOA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

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By:

Dane M. Teves

DArch Project Committee:

Spencer Leineweber, Chairperson
Judith Stilgenbauer
Jonathan Ching

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DEDICATION

This degree is dedicated to my grandfather, Rudy Brilhante. Architecture was one of his many passions, along with sports, poetry, history, painting, Hawai‘i, Bani (my grandmother) and God. He lived a life of influence. He instilled in me commitment, confidence, respect and a love for seeking knowledge. I am grateful to fulfill his dream of architecture, and live in his legacy.

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ABSTRACT

Indigenous thought process can influence current trends of creative problem solving via architecture and landscape design. This doctoral project contextualizes a method of design, as a way to address a global paradigm shift in understanding the relationship between God, land and humans. "Architectural Site Intimacy," enables a design (especially at significant sites) the opportunity to connect visitors physically, spiritually and intellectually to the place and to God. Blending traditional and contemporary knowledge, both story and science, allows for social, physical and psychological benefits. By connecting to place, culture and history; I developed a framework to increase human awareness of the natural environment through architectural design. The experience I gained included working with the community in participatory planning, and then incorporating the community input by integrating cultural concepts in a design.

"The Mamo Process" is a methodology which uses Hawaiian culture and site understanding to enable a meaningful connection between man and nature through architecture. This creates a meaningful interaction between the place, culture, and history that gives back to the place in a way that respects its' past and transmits it to the future; with authentic cultural representation. By focusing on different realms, including the earth below and the heavens above, the cultural relationship between man and place is fully realized.

By establishing a base of cultural influences and incorporating trans-cultural values of such as pono (righteous) and lōkahi (balance), we can reach interconnectivity between sea, land, people, and sky. The end objective is to harmoniously tune the different realms of influence through the power of design.

The designer's kuleana is to bring together the best practices of traditional and contemporary design strategies to choreograph an architectural environment and landscape that encourages a culturally appropriate experience. The design aims to educate visitors about the site moʻolelo. The design for the Kūkaniloko Center of Culture is part of a greater cultural revival initiative.

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ʻAʻohe pau ke ʻike I ka hālau hoʻokahi.

All knowledge is not taught in the same school.

- Mary Kawena Pukui, ʻŌlelo Noʻeau. 1983, 24

PREFACE:
SCIENCE AND STORY

Hawaiian ʻōlelo noʻeau or traditional proverbs support the development of identity as they are handed down from generation to generation. Through poetic wisdom, one can begin to understand deeper layers of meaning to, reveal unique characteristics of Hawaiʻi and humanity. The ʻōlelo noʻeau on page xi, is pertinent to numerous examples, however it is used in this dissertation as a guiding principle to incorporate traditional and contemporary evidence-based knowledge. This combines two ways of knowing in order to enable meaningful connections between man and nature through architecture in Hawaiʻi.

I believe modern evidence-based understanding when combined with a cultural understanding provides a comprehensive and more authentic base for architectural design methodology. This dissertation uses Hawaiian culture and site as a mechanism for developing a (design process) methodology. Based on my research, the outcome of this process will foster:

1. The ability to create a meaningful interaction between place, culture and history;
2. Enabling of authentic cultural representation;
3. Preserving the historical story of place, landscape and building, while respectfully advancing the storyline for the future generations.

My research will first analyze traditional Hawaiian kanaka (human beings) to ʻāina (land) relationships, cultural history and ecology. The second part of this process covers interviews conducted with current industry leaders of Hawaiian cultural integration in architecture and landscape design to understand their philosophies and processes of design. Finally, I analyze contemporary global leaders in evidence based sustainable practices through a case study of the Living Building Challenge and the application of related applied sciences. Each chapter will aim to provide the views of both scientific and cultural ways of knowing.

I believe archaeology, ancient architecture, legends, and place names add a rich and fascinating dimension to historical, geological, and ecological data of the cultural

landscape.[1] Perhaps greater than the individual facets of culture and landscape, is how they all function together. This defines the unique synchronicity that indigenous peoples have with their homes. This understanding is important for designers today to project cultural values into the architecture of tomorrow.

I have observed that architecture in Hawai‘i today does not provide culturally and site responsive design. The issue stems from a global paradigm shift that has disconnected itself from traditional global world views. Indigenous world views have been re-oriented according to capitalist beliefs of modern needs. Changing societies are caused by pressures of over-population, economy, society, and politics. These impacts cause a re-evaluation in beliefs that influence changes in the value construct. My work looks into how an indigenous culture can influence a contemporary planning process. This has the potential to increase the standards of design for Hawaiian legacy lands and cultural heritage landscapes. By blending traditional cultural knowledge, contemporary technology and practices, we can potentially allow for social, physical, ecological, and psychological benefits and change.

The goal of my work is to create a framework that increases humanity's awareness of their natural environment through architectural design and land management. The Hawaiian world view supported and maintained an intimate connection to the spiritual, cultural and ecological factors of a site. Through the integration of analytical research of traditional knowledge and contemporary design methods, we can maximize our relationship with the land and all of its relevant cycles.

Planners and architects should start from a basis of cultural understanding. The site selected for this dissertation is the birthing stones of Kūkaniloko. Kūkaniloko ("the sound that resounds from within") is known as the birthing place of many high chiefs and considered one of the most sacred sites on O‘ahu. The traditional measure of social structure and chiefly lineage was embedded in cosmology and landscape markers at Kūkaniloko. As such, Kūkaniloko has been compared by some to Stonehenge[2] because of its astronomical alignments and possible function as a center for chiefly learning.

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[1] Edward Kanahele, *A Guide to Hawaiian Archaeological Places of Interest*. Bishop Museum Press. 1991, xii.

[2] "Kūkaniloko –a Hawaiian Stonehenge?" accessed Jan. 7, 2015, http://www.ifa.hawaii.edu/tops/kukaniloko.html

My process can be used by architects and planners working in Hawai‘i and the Pacific. The understanding of cultural values, beliefs and their relationship to the land is very important to maintain cultural identity for Native peoples. In order to remodel the contemporary design methodology, traditional knowledge and value base must be added to the thought process framework. My hope is that energizing this movement will lead to trends of architecture and planning process in Hawai‘i to that in which it once was -- derived from the land itself.

CHAPTER 1:
HAWAIʻI HUMAN TO LAND RELATIONSHIP

1.0 HAWAIʻI ENVIRONMENT

Although all humans stem from the same hominid ancestors, belief systems tend to develop differently. To understand the indigenous Hawaiian kanaka ʻāina relationship, one must first understand the physical setting in which the relationship has developed.

1.0.1 GEOGRAPHIC LOCATION

Formed from the shifting of the Pacific Plate over a geologic hot spot, the islands in the Pacific Ocean have been in perpetual creation for the past 80 million years.[3] Molten basalt flows through volcanic lava tubes under the sea floor, over time breaking the surface of the sea and creating the island chain. As the Pacific Plate moves across the hot spot, the original volcano becomes extinct and a new volcano is formed in the area of the hot spot.[4]

As the lava underground heats the top of the rock above, the top of the volcano may collapse and form a caldera crater at the center. New lava ponds in the caldera to create a thick erosion resistant base formed from the slow cooling horizontal layers of basalt. Landslides, collapse, erosion and streams cut and recut the valleys shaping the islands into the geographic formations that are visible today. Referenced in the locational map (Fig. 1), the Waiʻanae volcano first rose over the sea 4 million years ago, followed by the Koʻolau volcano 2.7 million years ago.[5] Together, they make up the island of Oʻahu.

[3] Chuck Blay and Robert Siemers. *Kauai's Geologic History* (TEOK Productions 2004), 30
[4] Macdonald, Abbott, Peterson. *Volcanoes in the Sea: The Geology of Hawaiʻi* (Honolulu: University of Hawaiʻi Press. 1983), 98-113
[5] Macdonald, Abbott, Peterson. *Volcanoes in the Sea: The Geology of Hawaiʻi,* 217-222

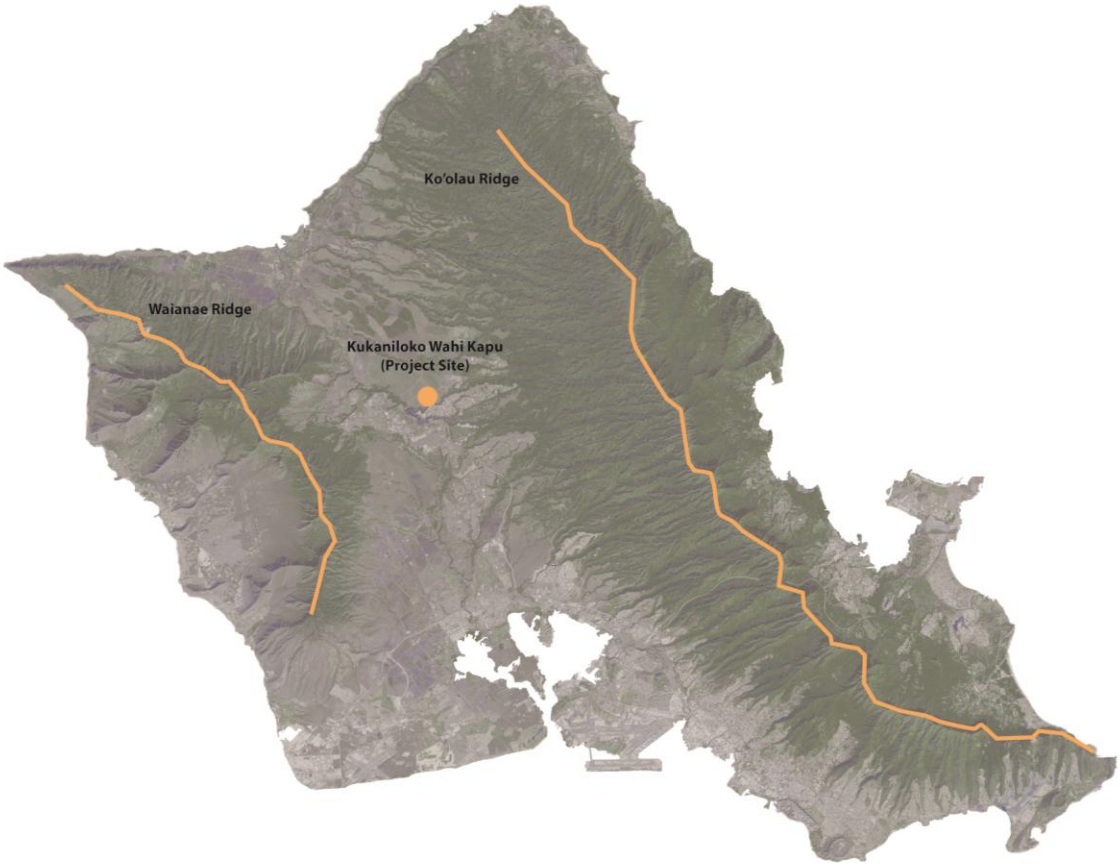

Figure 1: Areal perspective of Oʻahu
(Map highlights the two main mountain ranges and project site.)

1.0.2 PELE

The oral history and the stories of the goddess Pele used by Polynesians to pass on ecological knowledge are remarkably close to the scientific understanding of the geological creation of the islands. When Polynesians arrived in Hawaiʻi, the land was much different than the smaller islands they had known in the South Pacific. The fiery volcanoes and earthquakes on the Hawaiʻi island were a force that could destroy and create. The personification of natural phenomenology as akua (gods) began the understanding of the Hawaiian world view. Pele was created in a world where the natural forces were regarded as life forces and personified as gods.[6] Human beings are

[6] Herb Kane, *Pele: Goddess of Hawai'i's Volcanoes* (Honolulu: Kawainui Press, 1996), 5

intertwined with these natural forces, familial gods and the natural cycles. The connections of the human race to the gods will be explained in Chapter 1.2.3 page 9.

In the Hawaiian understanding, different forms or variations of the gods were related specifically to different intricacies of the perceived natural systems. Pelehonuamea, "Pele of the sacred land", or Pele'aihonua, "Pele the eater of land", is recognized as the goddess of fire, lightning, wind and volcanos -- she is respected for her power, passion, purpose and immense love. She is the embodiment of both creator and destroyer. The story of Pele explains how she followed her older brother, Kamohoali'i, in a canoe from Tahiti to Hawai'i along with her siblings Kanehekili, spirit of thunder, and Kapohoikahiola, spirit of explosion. Her fire through volcanic activity developed and reshaped the islands through transformation, cleansing and rebuilding. Angered by Pele's actions, some say that her older sister Namako O Kaha'i, goddess of sea and water, would put out every crater that Pele dug with her o'o[7] stick by flooding it with water. The significance of water and other natural elements in Hawaiian culture stem from stories dealing with the gods.

1.0.3 WATER SOURCE AND AQUIFERS

Wai'anae and Ko'olau Mountain Ranges are the two principle volcanic rock aquifers on the island of O'ahu. Cool trade winds blow over the windward side of the Ko'olau Mountain Range which bring the abundant rain, and create perennial streams, springs, lush interior valleys, and well-watered low lands and harbor areas.[8] This natural process is what enables life to be sustained on an isolated island in the center of the Pacific.

Layer upon layer of porous volcanic rock create aquifers that supply a subsurface water system for the islands. Sub-vertical dikes compartmentalize areas of permeable volcanic rock located near the caldera of a volcano. Dikes bring fresh water 1,600 feet

[7] Refer to Appendix A2: vocabulary table: Mary Pukui, and Samuel Elbert, *Hawaiian Dictionary* (Honolulu: University of Hawai'i Press, 2008)
[8] "Ground Water Atlas of the United States: Alaska, Hawai'i, Puerto Rico and the U.S. Virgin Islands HA 730-N," accessed Feb. 8, 2014, http://pubs.usgs.gov/ha/ha730/ch_n/N-HItext1.html#hi.

above the sea level on O‘ahu.[9] When erosion creates fractures in the dikes on the surface, a spring is formed. Fresh ground water flows from high elevations down towards the ocean. The word for water in Hawaiian is wai.[10] Waiwai is wealth. Back when the economy of Hawai‘i was based on subsistence living, one who has access to fresh water could afford to feed his family and have surplus to trade.[11] Hindrances to the natural cycles which provide the resources such as fresh water would impact the competence for survival on the Hawaiian Islands.

1.1 KĀNĀWAI AS LAW

Kānāwai “belonging to the water”, the word for law, is derived from the managing practices governing the use of fresh water.[12] Fresh water resources were very significant in regards to human needs. This system of law was created to ensure the balance of nature and its relative cycles. In later time periods, a kapu (taboo) system was designed to create an ordered management program over resources and sacred areas. The laws were created where the natural resources defined the use and the significance of the land. Some kapu if broken were punishable by death; therefore emphasizing that the balance of the natural world was a greater importance than individual human life.[13] These practices were not only important for survival, but also defined Hawaiian spirituality. Hawaiian spirituality and identity is an expression of an inherent relationship with the land. The core Hawaiian values guided their spiritual beliefs, social and economic system; land use and settlement patterns; and natural resources acquisition. Necessary for subsistent living, the harmonious relationship between humans and the environment drove cultural practices and rituals. These philosophies linked human interaction with the environment. The human role in ecology is a mutualistic approach. When the land is treated properly, the result is a healthy harvest.

[9] C.D. Hunt, “Geohydrology of the island of O‘ahu, Hawai‘i.” (U.S. Geological Survey Professional Paper 14212-B, 1996), 54
[10] Refer to Appendix A2: vocabulary table: Pukui, and Elbert, *Hawaiian Dictionary*, 2004,
[11] Mary Pukui, *‘Ōlelo No'eau: Hawaiian Proverbs and Poetical Sayings*, (Honolulu: Bishop Museum Press,1983),
[12] J.S. Williams. *From the Mountains to the Sea: Early Hawaiian Life.* (Honolulu: Kamehameha Schools Press, 1997),
[13] Williams. *From the Mountains to the Sea: Early Hawaiian Life.* 1997,

This has been recognized by cultures around the world for centuries (ie: Aborigines in Australia, Eskimos in Alaska, Native American Indians and more).

1.1.1 VULNERABILITY OF ECOLOGY

The impacts of humans on a fragile ecology such as Hawai‘i determine the success of survival for Hawaiian society. The cultural lifeline was carried out in the ability to harmoniously integrate oneself with the natural world. The natural cycles of the environment were of such significance to the Hawaiian people that not only were they perceived as direct correlation to the akua, but significant aspects were embedded in the language of governing.

Being isolated in the middle of the Pacific, Hawai‘i’s resources are very limited and greatly impacted by human management. In Hawaiian society, adhering to cultural traditions and practices were important for survival. As a cultural practitioner has stated:

> “If we consider what it took to get here to Hawai‘i (people and resources) and the culmination of insight and expertise gained along the way, then what level of care and energy should we place in our decisions? Especially as it relates to our natural resources; whether decisions take place then or now.[14]”

If we acknowledge the perspective of the navigators (not knowing if one will need to return home), then we acknowledge the significance of culture and resources and the need for protection. Hawaiians were mindful about decisions regarding planning and architecture that might affect their future.

1.2 HISTORY OF HAWAIIAN RELATIONSHIP WITH LAND AND VOYAGING

Polynesian navigators who arrived on the shores of Hawai‘i brought with them cultural values which set the foundation for the Hawaiian relationship with the land. The study of human behavioral history reveals inherent values which are passed on from

[14] Kaiwi Nui Yoon. “Architecture Landscape” (presentation, Architecture 451, University of Hawai‘i, Mānoa Jan. 7, 2012).

generation to generation and how they are maintained and used to inform the actions of daily life.

As societies around the world developed, the societies with higher capabilities of food production could spend less time focused on sustenance and invest more time in art, science, and military. The changing societal format resulted in developing hierarchical social classes. The benefits of having strong military force could allow conquest of new lands and new resources. The aspiring greed drove some developed societies to an even greater lust for self-advancement.

On the other hand, some societies, where their geographic location was less capable of providing for a large population, developed a different attitude towards the landscape. Societies that spent more time working the land in order to provide food established a mutual relationship with the environment and realized the importance of harmony among human and land. [15] The land provides for people; therefore, humans need the land. The impacts of humans on the land effect the survival of all.

[15] Jared Diamond. *Guns, Germs, and Steel: The Fates of Human Societies*. (New York: W.W. Norton & Co, 1998).

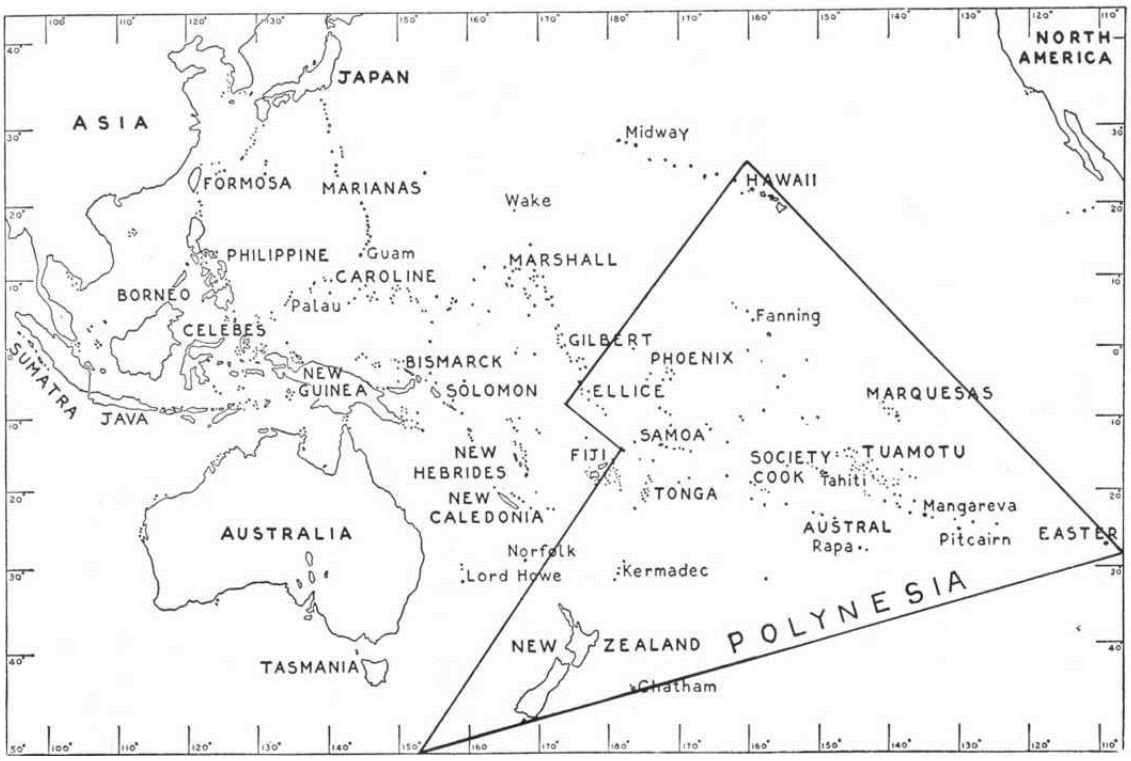

Figure 2: Map of Pacific showing Polynesian Triangle[16]

1.2.1 ISLAND MIGRATION PATTERNS

Polynesian voyagers navigated the Pacific Ocean by triangulation and astronomy. Polynesian voyages were purposeful and well executed with the intention of exploration and discovery. Some archeologists believe the voyages originated in Taiwan, north of the Philippines, and then island hopped outward from near Oceania to remote Oceania. Figure 2, shows the relation between the Polynesian Triangle to Asia. Reaching the Hawaiian archipelago demonstrates the prowess of Polynesian sailors. There is some scientific evidence that suggest Polynesians even got as far as South America.[17] The Pacific Ocean is roughly 70 Million square miles and consists of 100 islands. The Hawaiian archipelago is 2,467 miles from California, 5,280 miles from the Philippines, 4,900 miles from China, and 3,850 miles from Japan. By 1380 AD, Polynesians using celestial navigation, traveled and discovered islands in the remote

[16] "Map of the Pacific." Accessed Sept. 9, 2014, http://nzetc.victoria.ac.nz/etexts/BucExpl/BucExpl010a.jpg.

[17] "Did the Polynesian Discover America?" Mar 20, 2012, http:www.history.com/videos/did-the-polynesians-discover-america

Pacific.[18] The geographic isolation was the reason Hawai‘i was one of the last parcels of land found by people. This alone sets the precedent for how unique their geological system is.

1.2.2 PLANTS: PHYSICAL AND PSYCHOLOGICAL STRENGTH

Plants were physical representations of historic beliefs and provided mental and physical security for the dangerous voyages. It took months to prepare for these voyages and vast amounts of resources. The Polynesians used 60-foot long double-hulled outrigger canoes made from Koa trees caulked with breadfruit sap. The sails were made from weaved lauhala *(Pandanus tectorius)* leaves tied to the canoe with over 1500 feet of lashings made of coconut fibers. Looking at the construction of the canoes, one can see how important plants were in Polynesian voyaging. These plants not only dictated the survival of the Hawaiian people, but held physical and spiritual ties to their past.[19] Millennium old understandings of the natural elements and their functions of various natural resources (whether for utilitarian, medicinal or ceremonial), were established in the land and culture in which they voyaged from.

The ancient Polynesian voyagers also took with them not only supplies for the voyage but also provisions that would be essential to them upon arrival on new land. Today, the Hōkūle‘a, “Our star of gladness,” is a recreated double-hulled sailing canoe which retraces the journey across the Pacific.[20] According to Hōkūle‘a crew members, Na‘alehu Anthony and Ka‘iulani Murphy, only the daily essentials (such as fresh drinking water, fishing tackle, coconuts, dried fish, and fruits) are taken on board.[21] The ancient navigators brought with them plants and animal pairs so that upon arrival in a new land, the Polynesians could start a new population.

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[18] Patrick Kirch, *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*, (Honolulu: University of Hawai‘i Press, 1985), 126.
[19] E.S. Craighill Handy, Elizabeth Green Handy and Mary Pukui, *Native Planters in Old Hawaii: Their Life, Lore, and Environment*, (Honolulu: Bishop Museum Press, 1991)
[20] “The Story of Hokule‘a,” accessed Jan. 7, 2015, http://www.hokulea.com/voyages/our-story/
[21] Na‘alehu Anthony and Ka‘iulani Murphy. “Voyaging” (presentation, Architecture 451, University of Hawai‘i, Mānoa Jan. 7, 2012)

The plants that were brought had their own uses as well; be it for their utilitarian, medicinal, or food and dietary needs.[22] The exact number of plant species that were taken on board the canoe remains uncertain. Many experts believe that about two-dozen plants were introduced to Hawai‘i via the Polynesian voyages.[23] There are many different theories that question whether the plants were brought purposefully or accidentally and whether the plants were indigenous or if humans played a role in their introduction. One plant that was introduced is the ‘ohe (*Schizostachyum glaucifolium*); though to many, the true origin is unknown. Other plants that Polynesians brought with them that were already indigenous to the Hawaiian Islands include: hala *(Pandanus tectorius),* hau (*Hibiscus tiliaceus),* kou (*Cordia subcordata*), and niu (*Cocos nucifera*). All of these species are used for their fibrous qualities. Some ferns and grasses were brought to Hawai‘i by accident. Some of them are the ‘ihi‘ai (*Oxalis stricta*), kāmole (*Ludwigia alata*), and neke (*Adiantum pedatum*).[24] Most of the plants that were brought to Hawai‘i by the Polynesians grew without human assistance. However, there are a few plants that required human assistance in order to grow; such as the ipu (*Lagenaria siceraria*) and ‘uala (*Ipomoea batatas*).

The Polynesians were uncertain of the conditions and availability of natural resources in the new lands in which they arrived upon. The canoe plants not only served utilitarian but they were also physical ties back to ancient ideology and cultural values. The Hawaiian spirituality and identity stems from the land, going back to creation by Papa (Earth Mother) and Wākea (Sky Father), as mentioned in the Kumulipo.

1.2.3 KUMULIPO: GENEALOGICAL CONNECTION TO LAND

Hawaiian spirituality and identity is an expression of an inherent relationship with the land. One interpretation of Hawaiian identity is derived from the Kumulipo, a cosmological /genealogical chant passed on from the ka po‘e kahiko (the people of old) illuminating the inherent relationship of the people with the land. Genealogy is a

[22]Anne Gross, *Lā‘au Lapa‘au: An Introductory Guide to Hawaiian Medicinal Plants*. (Honolulu: University of Hawai‘i Press, 1998).
[23]P.A. Cox. *Wild plants as food and medicine in Polynesia*. (Tuscan, AZ: University of Arizona Press, 1994) 102
[24] L. Lucas. *Taro. Plants of Old Hawai‘i.* (Honolulu: The Bess Press, 1982), 71-77.

spiritual, lineal connection originating with the mating of Wākea (Sky Father) and Papa (Earth Mother). That Papa and Wākea bore the Hawaiian Islands. Hawai‘i and Maui came first and then their daughter, Ho‘ohōkūkalani. Ho‘ohōkūkalani grew to become a great beauty that Wākea, her father, desired. He went to a kahuna (priest) to come up with a solution because he did not want Papa to find out. ‘Aikapu “sacred eating” (a religious act that separates males from females in the act of eating) was the solution.[25] The kahuna set aside four nights of worship of the akua. On such nights, men were forbidden to sleep with their wāhine (women). On one of these nights, Wākea and Ho‘ohōkūkalani mated. From them, two sons were born: Hāloanakalaukapalili and Hāloa. Hāloanakalaukapalili, the elder of the two, was a still born and placed in the earth. From there, a kalo plant (*Colocasia esculenta*) grew.[26] A bonding responsibility (Kuleana) of the elder brother is to feed and protect the younger; in return, the kuleana of the younger is to obey, respect and take care of the elder. The kalo plant is a kinolau or a physical manifestation of the akuas, and a genealogical tie of Hawaiians to the environment. This stems an interdependent connection with land.[27] Thus, plants were not only necessary for survival, but a link to the past as being part of the familial unit.

The word for family in Hawaiian is ‘Ohana. The prefix ‘oha means the sprout or bud of the Kalo plant. Kalo is seen in the same manner as part of the Hawaiian extended family.[28] Although farming of the land was for utilitarian purposes, it also served a greater importance of caring for the spiritual and familial connection to the land. Every act was accompanied with prayers to the deities and akua to ensure what was being done was in the best interest of the land. The importance of the interaction with the environment is recognized in the people of the land. Connection allows for the establishment of symbiotic and nurturing relationships which are inherent in Hawaiian culture.

[25]Lilikala Kame‘eleihiwa, *Traditional Hawaiian Metaphors*, (Honolulu: XanEdu Custom Publishing, 2008), 14.
[26]D.L Plucknett, Taxonomy of the genus *Colocasia*. (Honolulu: University of Hawai‘i Press, 1983), 14-19.
[27] Samuel Kamakau, *The Works of the People of Old*. (Honolulu: Bishop Museum Press, 1987)
[28] E.S. Craighill Handy and Mary Pukui, *Native Planters in Old Hawai’i. Their Life, Lore and Environment*, (Honolulu: Bishop Museum Press, 1972)

1.2.4 HAWAIIAN VALUE SYSTEM

The general guiding values regarding human relation with land have evolved over time, but continue to maintain the core traditional ideology. Culture is also a dynamic structure. Although behavior is learned and passed to new generations, culture has the potential to change through time. Culture is learned and transmitted in a social context and modifiable. It is dependent on an infinite interacting matrix of individual personalities and their choices; thus, culture changes as it is passed down generation to generation.[29] It includes sets of traditions, practices, and customs that govern the behavior and beliefs of the people. This system consists of expressive elements and means of communication that help people understand how to relate to the universe and how to operate within their natural and social environment.

These cultural philosophies thus manage a person's role in the natural environment. A cultural-environmental relationship was perhaps essential for the survival of the population in a remote island location such as Hawai'i. Although there was a common ancestral link and traditions which united them all, the Hawaiian islanders expressed unique differences found on each island. Variations in governance, language, tattooing and cultivation are examples of these differences. A blend of guiding values found on all the islands can be formed together to create a list which influence cultural philosophies today. In Hawai'i these guiding values include: [30]

- *Aloha*: to love unconditionally without expectation
- *Aloha 'Āina*: to maintain an intimate relationship with the land and all of its interactive elements. Loving the land as a family member (*Kūpuna*) and treating it accordingly.
- *Aloha Kekahi I Kekahi*: to care for another with love and kindness without the expectation of compensation.
- *Ha'aha'a*: Humility, to humble oneself, realizing ones role as a small element within the environment.

[29] Conrad Kottack, "Mirror of Humanity. A Concise Introduction to Cultural Anthropology." (Boston: McGraw-Hill Higher Education, 2007), 42-48.
[30] Hokulani Cleveland. *'Ōlelo 'Ōiwi*, (Hawaiian Language Fundamentals, 1994); Pukui, Mary Kawena, Samuel H. Elbert. *Hawaiian Dictionary*, 1986. Lilikala Kame'eleihiwa. *Traditional Hawaiian Metaphors*. 2008, 16.

- *Hōʻihi*: to respect all things, as everything has significance.
- *Kōkua*: to offer and provide aid without expecting reciprocity.
- *Kuleana*: a bonding responsibility, relationship or occupation.
- *Laulima*: working together as a cohesive group toward a shared goal.
- *Lōkahi*: working harmoniously in a unit.
- *Lokomaikaʻi*: the kindhearted way of being and considering all things.
- *Malama ʻĀina*: to care for, maintain, preserve and protect the land through unconditional service and supporting its health through human action.
- *Pono*: doing the right thing, at the right time, for the right reason, without expectation of compensation.

Human actions were guided by these values in order to create a social order. Extraction of resources meant considering your neighbor, the ecology and future generations.

1.3 HAWAIIAN SOCIETY AND ECONOMY

The needs of early Hawaiians were focused on acquiring food, water, shelter and protection. As the needs of society were met, the physical and spiritual relationship to land was changed.

1.3.1 SETTLEMENT & MANAGEMENT: COLONIZATION PERIOD (800-1100AD)

Settlement was based around existing fresh water resources. During the development period of Hawaiian culture (800-1100AD) Hawaiians established residences within the valleys of the windward side of the island.[31] The windward side is typically the wet side due to the steep mountains that collect the clouds and rain. Each

[31] Patrick Kirch, *When Did the Polynesians settle Hawaiʻi? A Review of 150 Years of Scholarly Inequity and a Tentative Answer*. (Based on a Keynote Address delivered to the Society for Hawaiian Archaeology at the 2010 Annual Meeting at Waialua, Kauaʻi, University of California, Berkeley, 2011) 3

valley becomes its own watershed complete with multiple ecosystems. Typically one valley or ahupua'a (sector of land) would be settled by an 'Ohana. Based on topography, natural resource location, and available food production area, the ahupua'a system was established. The water determined the settlement patterns in an ahupua'a. The population was directly related to the carrying capacity of the land. People lived in close relation with the land they worked, getting to know the intricacies of the place. A portion of the family lived upland, cultivating lo'i (taro patches) which followed the river, while other settlements were near the coast accessing the ocean resources. Housing complexes were designed to maximize the use of the land with little negative effects on the ecological cycles. Complete trails extended from mountain to ocean to connect dispersed settlement and aid in the barter system between farming in the valley and fishing near the sea. The barter system was the basis of the Hawaiian economy. As the middle generations worked the land, the kūpuna (grandparents) passed down the traditional ecological knowledge to the keiki (children).

1.3.2 FOOD RESOURCES

The success of farming societies around the world relied primarily on geographical location and availability of native resources. Some areas were better equipped to maintain large populations due to their available selection of native species. The traditional landscape in the Pacific had native plants that were less supportive in providing for a large population. A native flora could enable a society to prosper if it had high nutritional value and low input energy required for harvest. Well managed storage facilities allowed Hawaiians to provide higher yields on returns and maintain sustenance during draught periods.

The Hawaiian diet was based on agricultural carbohydrates and vitamins, supplemented with protein from fish and other marine biota. The main staple of the Hawaiian diet was kalo and 'uala.[32] These two plants were brought to the islands as canoe plants. The canoe plants provided nutritional value, medicinal functions, and

[32] Isabella Abbot. *Lā'au Hawai'i: Traditional Hawaiian Uses of Plants*. (Honolulu: Bishop Museum Press, 1992). 74

utilitarian material resource. Once settled into the ahupua‘a, plants were chosen based on their usefulness and ability to survive the natural conditions. For instance, the entire kalo plant could be eaten. The huli or the crown of the kalo, would then be replanted to bear new roots.[33] Although these plants provided the nutritional value needed to survive, the labor input required was high. Most of the farming was done at middle elevations as Hawaiians recognized the importance of maintaining a balance ecosystem to benefit the thriving society.

The forest was one of the most important resources for Hawaiians. They worked with the forest to maintain a well-balanced ecosystem. A harmonious relationship with the forest would aid the water cycle. Compared to a cut forest, a lush forest helps gather cloud formations to transport water to different parts of the island. These clouds collect and transfer moisture into the ground through precipitation, and fill the rivers that run down the valley. This surface water is transferred through percolation and filtration of the soils to refill the underground supply of water in the aquifers, which is then carried back to the surface and out of the springs. Streams flow into fresh water bodies, and make their way out to the ocean. Out in the ocean, evaporation brings the water molecules back up to form clouds where the cycle is repeated.[34]

1.3.3 PRESSURES OF POPULATION: EXPANSION PERIOD (1100-1650AD)

As people became more sedentary in Hawai‘i (1100-1650AD), the population on the islands increased.[35] With later migrations brought new religions which contrasted the relationship the earlier Hawaiians had with the land. A high priest class from Tahiti was introduced that brought the heiau concept (temple), feathered images, and human sacrifice. The core values of mans’ role in the environment would remain the same; however, population expansion and environment limits added pressures on society that caused them to reevaluate their beliefs. This influenced a change in the value construct. With the high chiefs, came the birth of the Ali‘i Nui Class, or ruling chiefs. These were

[33] Potgieter. *Taro (Colocasia esculenta)* (Dietetic Association, 1940), 16:536–540.
[34] Jonathan Ching, *Hawaiian Ahupua‘a Planning Approach (H.A.P.A) for Rural Communities in Hawai‘i: Modern Culturally-Based Sustainable Living Through Planning for Architecture*. (DArch thesis, 2010)
[35] Kirch, *When Did the Polynesians settle Hawai‘i? A Review of 150 Years of Scholarly Inequity and a Tentative Answer*. 5

believed to be direct descendants of the gods. There were two paths to power at this time. One path through the god Lono allowed for increased political power through marriage. The other path through the god Kū allowed mana to be gained by violence and warfare.[36] Although the islands were under new authority, the protection of the existing ahupuaʻa system remained and the land was still stewarded by the makaʻainana (commoners). Living on the land, the makaʾainana were tied to the land which they had created a relationship with, rather than to the chief. At any point, the families could move to a new ahupuaʻa under a new chief; however, this was avoided due to the value systems Hawaiians had tying them to their familial lands. In return for political protection from the Aliʻi Nui and his koa (warriors), the ʻohana would provide food and natural resources from their respected ahupuaʻa to the chief and warriors. Pressures of population lead to advances in food production.

1.3.4 TECHNOLOGY ADVANCEMENT: PROTO-HISTORIC PERIOD (1650-1795AD)

The new hierarchical society enabled the coordination of larger communal projects that included expanding existing ʻauwai irrigation ditches to provide cool water to flow from terrace to terrace in the loʻi patches. Kalo is best grown in about two feet of non-stagnant water to keep it from scorching in the sun. The irrigation ditches needed to be engineered to avoid erosion of the ditches themselves and the terrace walls.[37] The architecture of these terrace walls are fascinating in that they are unique to each ahupuaʻa, built from the stones of the area and constructed for the intricacies of the location. They were dependent on the slope of the land and designed to bring water into the terraces from upland springs or rivers.[38] The soil of the actual terrace pond fields needed to be impermeable to allow as much water as possible to replenish the river downstream. The water could again be used downstream by other farmers or to feed into

[36] Lilikala Kameʻeleihiwa, *Native Land and Foreign Desires Pehea La E Pono Ai*. (Honolulu: Bishop Museum Press,1992).
[37] Marion Kelly. "Dynamics of Production Intensification in Pre-contact Hawaiʻi." *What's New? A Closer Look at the Process of Innovation*. (London: 1989)
[38] Allen-Wheeler, J. *Luluku: sit upland agricultural system in Kāneʻohe, Koʻolaupoko. (Honolulu: Department of Anthropology Bernice P. Bishop Museum,* 1985).

fishponds. One acre of kalo can feed twenty to thirty people. If cared for properly, loʻi would not need to lay fallow and continually be in production for many years.[39]

Walled fish ponds were located at the river mouth where the nutrient rich fresh water mixed with ocean water tides. This process fed herbivorous fish algae on the bottom of a walled fish pond; inherently short circuiting the food chain to increase protein source 100 fold.[40] The fresh water which flowed down stream, absorbed all the nitrogen from the loʻi and stream bed to produce high amounts of algae as it mixed with the salt water. The fish ponds captured grey mullet and milk fish to capitalize on their spawning patterns as they moved in and out with the tides. However, completion of large scale projects was only possible with the coordination of labor by the chiefly class.[41]

As the population continued to increase, so did the advancements of food production. The encroachment into new land pushed settlement to the leeward (dryer) side of the island.[42] A new style of farming technology was developed and dry land kalo patches and other types of vegetables were now farmed.[43] Systematic dry land fields which grew crops with higher drought tolerances were created in the new vegetation zones.[44] Just before European contact (1795 AD) the Hawaiian civilization was highly developed in agriculture as well as aquaculture.[45]

In order to maintain the highest efficiency, all built environments and natural structures of a cultural landscape had significant value and specific functions. From walls, terraces, bridges, dams, housing structures to temples, the placement and layouts were important to the landscape. This usually supported the surrounding environment. The infrastructure needed to support large populations often required the coordination of lots of people through some sort of governmental effort.

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[39] R.C Wyllie "Answers to Questions. Proposed to His Excellency,"(Honolulu: Bishop Museum , 1848), 82.
[40] Marion Kelly. "Dynamics of Production Intensification in Pre-contact Hawaiʻi," *What's New? A Closer Look at the Process of Innovation*, 1989. 84
[41] Kamakau. *The Works of the People of Old: Na Hāna a ka Poʻe Kahiko*. 1976, 47-48.
[42] Samuel Kamakau. *Ruling Chiefs of Hawaiʻi*. (Honolulu: Kamehameha Schools, 1961) 78
[43] Kelly. Dynamics of Production Intensification in Pre-contact Hawaiʻi. *What's New? A Closer Look at the Process of Innovation*. 1989, 87
[44] Newman. *Aboriginal Hawaiian agriculture: the archaeological evidence*. 1983, 18
[45] Kirch, *When Did the Polynesians settle Hawaiʻi? A Review of 150 Years of Scholarly Inequity and a Tentative Answer*. 2011, 89

1.3.5 GOVERNMENT COORDINATED WORKFORCE

Technological advancements such as irrigated terraced pond fields and aquaculture provided more efficient ways of food production. These large scale projects required organization and more developed hierarchical society. Instead of seeing a greater importance on self-advancement, Hawaiian society saw a government focus on tending to the environment and finding a seamless balance between human interactions with the landscape. Establishing a hierarchical society amongst the Hawaiians was a result of the new Aliʻi Nui ruling chief class. Once self-ruled ʻohanas led by the advice of their poʻo (head of household) were now facing a new systemization. The Haku ʻOhana (eldest male) was now using his generational knowledge and experience to assist the konohiki (appointed head of ahupuaʻa).[46] The konohiki worked closely with the haku ʻohana because he understood the deep connections with the land and the intricacies of the environment. The konohiki, "was the appointed land steward who lived in the ahupuaʻa, oversaw the chiefs' interests, and was responsible for the daily management of its production system."[47] He was the middle man between the chief and the commoners. A healthy relationship among the system resulted in a productive ahupuaʻa and strong military backing.

1.4 TRADITIONAL HAWAIIAN SPIRITUALITY

At this refined state of Hawaiian society, the stable economic situation allowed more time to be invested in military, art, and religion. These developments in society embodied traditional Hawaiian spirituality and the Hawaiian world view. The belief that Hawaiians are an integrated part of the natural cycles of the universe prevailed through the genealogical origins of the akua as ancestral parents and the creation of land as elder siblings. The responsibility of Hawaiians to act in accordance with their ancestors needs codifies a certain behavior in the present. A special class of priests perpetuated Hawaiian

[46] Lorrin Andrews. *A dictionary of the Hawaiian language, to which is appended an English-Hawaiian vocabulary and a chronological table of remarkable events*. (Rutland, Vt: C.E. Tuttle Co, 1974).
[47] Department of Geography, "Contemporary Subsistence Lifestyles in Hawaiʻi". (Hilo: University of Hawaiʻi, 1998).

spirituality with their holistic understanding of the natural cyclic truths. This special class of priests used this knowledge base to inform Aliʻi Nui on important action items.

1.4.1 E NOʻONOʻO HAWAIʻI (THINK HAWAIIAN)

Hawaiian culture felt so strongly about protecting resources, that a special class of priests was dedicated to advising the location and construction of structures. The kuhikuhipuʻuone (architect) needed an understanding of the landscapes natural resources and features (ie: ridgelines, coastlines, ecological zones, and watersheds) in order to define the purpose of the landscape.[48] The role of the priest was to ensure that the presence of humans fit harmoniously in the natural processes of the environment. This required a very deep understanding of ecology and human needs, in order to tie them together with the foresight of future implications. The state of lōkahi describes the functioning relationship of every system (ecological and social) as being in unison. The management of natural resource quality and quantity put value on food, medicine, religion, war craft and utilitarian purposes required for the survival of the Hawaiian people.

The word lōkahi can be closely related to balance, or working harmoniously as a unit.[49] This balance is created between the land and its caretaker. A person has a physical and spiritual kuleana to work harmoniously with the natural environment. The natural resources defined the use and significance of the land. The quality and quantity of the resources are valued in food, medicine, religious and utilitarian purposes. These natural resources were potentially a point of controversy; and were thus, access to them needed to be controlled. Asset-based planning is a large issue in Hawaiʻi.

The goal of this paper is to realize that Hawaiians first studied the land and natural elements to become very familiar with the functions of its assets. In recognizing that traditional ecological knowledge was recorded and passed down through oral history by means of chants, legends, myths, genealogies and place

[48] Refer to Appendix A2: vocabulary table : Pukui. *Hawaiian Dictionary*. 1986,
[49] Kameʻeleihiwa. *Traditional Hawaiian Metaphors. Center of the Pacific*. 2008, 16.

names (ie: wind, rain, and particular features), this paper discusses how understanding ʻolelo (language) can influence site intimate architectural design. Hawaiians applied their expertise to take care of these assets. We must continue to react to the ebb and flow of both environmental and economic pressures.

1.4.2 KUHIKUHIPUʻUONE

The Kuhikuhipu'uone, the "Hawaiian Architect", was an elite class of people trained in the art of holistically understanding the environment and interacting elements. A comprehensive knowledge was the foundation required for informing the construction of any architectural structures of importance. The kuhikuhipu'uone was not only an architect, but an advisor to the Ali'i Aimoku, the highest chief who governs the land and military. Construction under the kuhikuhipu'uone was never done for individual purpose, but rather for a larger functioning matrix. Whether the structure was for military advantage or not, the location of built structures depended on celestial and natural elements, resource availability, and the relation to other natural and man-made markers. Construction of important structures was designed to increase human understanding and relationship with the natural world. The kuleana of the kuhikuhipuʻuone was to ensure pono. One ʻolelo noʻeau states:

> Ka mana o kina ʻole
> "Do the right thing in the right way, at the right time, in the right place, to the right person, for the right reason, with the right feeling, the first time."

Ethical advisory by the kuhikuhipuʻuone would be based on his interpretation of ancestral knowledge.

1.4.3 CELESTIAL IMPORTANCE

Based on a history of waʻa (canoe) navigation using the stars, celestial and natural alignments, inherent values would allow for efficient integration with the

surrounding environment. Aside from religious significance, the symbiotic interaction with the natural environment depended on the sun alignments, moon patterns, and celestial locations of a particular landscape. Celestial alignment is an elaborate system of way finding understood through a particular Hawaiian concept of direction. Transferred from navigating vast oceans, the Hawaiian sense of direction on land was definite. In accordance with the solstices, the moon was also carefully observed. In knowing how the moon's gravitational pull controls the tide, on can understand the relation of water and nutrients within a plant. An organized planting cycle was centered on the cycles of the moon. These observations dictated the spatial construct and placement of various structures. Resource location, quality, and abundance together with accessibility are essential to the arrangement and location of buildings and structures. Land's natural resources remain to be the central reason of arrangement. Accessibility to these natural resources are constructed and maintained to ensure a symbiotic balance between nature and human contact.[50]

1.5 ʻŌLELO MAKUAHINE (MOTHER LANGUAGE)

The oral language holds a certain degree of power behind the words being selected. Often times, certain words can have precise meanings when used in certain context, however, the poetic nature of the language can enable certain words to disguise the meaning. The concept of kaona (multifaceted meaning) can provide cues to a wide variety of meanings. ʻŌlelo Makuahine is another example of the holistic approach to understanding. It is thus necessary to learn as many kaona as possible when trying to formulate an understanding of a certain idea.

As Polynesians colonized the Pacific, they brought along with them food, animals and skill sets.[51] Much of their language traveled with them and many of their stories are still being told today. During the time of Western contact, one of the big reactions to Hawaiian culture was that there was no written language. However,

[50] Kirch, *Subsistence and Ecology*. (Honolulu: University of Hawaiʻi Press, 1985), 126.
[51] Kirch, *When Did the Polynesians settle Hawai'i? A Review of 150 Years of Scholarly Inequity and a Tentative Answer*. 2011, 94

this was not a problem for Hawaiians. They were able to pass down traditional knowledge accurately without a written language.

1.5.1 MEANS OF SHARING: MO‘OLELO (STORIES)

Mo‘olelo (stories) were the primary documentation sources of knowledge. The knowledge about genealogical lineage, ecological understanding, history of events, and cultural rituals were all passed down through oli (chant), pule (prayer), and hula (dance). The mo‘olelo tells of how Polynesians were able to adapt to their new natural environments. Stories carry the history of how human survival was made possible over the ocean and how the islands were “fished” up from the ocean.[52]

1.5.2 INOA (NAMES)

David Malo describes that a person regardless of where he was on the land, knew how to orient themselves in accordance with cardinal directions and the path of the sun.[53] Hawaiians were so in tune with their surroundings that they had an ideology known as ‘ikepapalua or a deeper “supernatural” for understanding of the landscape.[54] This was done through observational knowledge gained through the experience of working the land over time. It enabled them to give specific names to the land and its natural features.[55] Giving a place a name developed a personal connection with that place.

This information was passed down through an oral history of precise place, wind and rain names that often contained clues regarding a description of potential use or function. Names often demarcate the significance of available natural resources. The knowledge base acquired by indigenous people over hundreds of years through direct contact with the environment is referred to by the US Fish and Wildlife Service as the working definition of Traditional Ecological Knowledge

[52] David Malo. *Mo‘olelo Hawai‘i. Hawaiian Antiquities*. (Honolulu: Bishop Museum Press, 1951) , 174.
[53] Malo. *Mo'olelo Hawai'i. Hawaiian Antiquities*. 1951, 174
[54] Samuel Elbert. *Traditions of O‘ahu: Stories of an Ancient Island.* (Honolulu: Bishop Museum Press, 1986) 23
[55] Abraham Fornander. *Hawaiian Antiquities and Folklore,* (Honolulu: Bishop Museum Press, 1917),1918

(TEK). TEK is a cumulative body of knowledge, practices, beliefs, adapted and passed down over time concerning the relationship of beings with the natural environment.[56]

1.6 LESSONS FROM TRADITIONAL RESEARCH

The Hawaiian man to land relationship was created prior to the arrival on the shores of Hawai‘i. The relationship continuously evolved based on societal, geographic, and economic needs. The fragile environment of Hawai‘i demanded mutualistic interaction between humans and the ecology. Hawaiians understood the diverse scales of the universal life cycles and the intricate relations one element would have with another. They saw themselves as part of the familial set of ecological cycles of the earth and the universe. The identification of the human role in the universe codified appropriate behavior in order to maintain balance across different scales. Isolated in the center of the Pacific, the impacts of man were largely felt in the ecology; thus, human impacts on the land were managed cautiously.

Evolving over time to a more refined state of land and social management, the relationship of man to land was also shaped by the Hawaiian economy. Food production aided by the barter system necessitated the reliance on the productivity of the land. Evidence based findings shows us that Hawaiians had a holistic understanding of the way the environment worked and how to maximize efficiencies to produce food and support society. Hawaiian spirituality and the religion emphasized a connection to the land and were used to pass on Hawaiian values to future generations. The values are poetically documented in the oral language.

[56] US Fish and Wild life Services. “Traditional Ecological Knowledge for Application by Service Scientists”. *Native American Program*. (February 2011). 2

CHAPTER 2:
APPLICATION OF RELATIONSHIP IN HIERARCHICAL SETTING

2.0 HIERARCHICAL SETTING

The Hawaiian societal developments that impacted religion and social structure were passed on to dictate the way people interacted with the land. Religion governed society so much that an act of disobedience to authority was considered an act of disobedience to the gods. Hawaiian aliʻi (chief) are believed to be direct descendants of the gods. The presence of gods in a particular place required a certain protocol prior to entry. Thus, Hawaiian spirituality was manifested in the societal hierarchy.

The flow of mana, or spiritual power, governed the social-political structure. Originating in the celestial heavens above, mana is mediated through the genealogical connections of the environment and aliʻi. The presence of mana can be experienced by the bringing together of heaven and earth in a way that resonates a feeling of empowerment.

2.0.1 HIERARCHY OF MAN

In Hawaiian hierarchical society the ruling chief was at the top because they had the greatest concentration of mana provided by the gods from which they descended. Kirch states, "The chief is the mediator, receiving and transmitting the offerings of the people to the ancestral and tribal deities. It is he who, on behalf of his people, recites the appropriate ritual formula for securing rain, bountiful harvests, success in fishing, or victory in war.[57]" The chief's mana was revealed upon the success of their achievements and the productivity of their lands; thus, they relied on the support of the makaʻainana. The chiefly right to control the land was dependent on lineage. The flow of mana from first the gods was recorded in the chiefly genealogies. Mana was maintained by pono action, and marriage to someone of similar rank. Mana could be gained by marriage to a

[57] Kirch, Patrick. *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*, 1985, 37

person of higher rank and lost by marriage to a person of lower rank or by disobeying the gods.[58]

2.0.2 HIERARCHY OF "PLACE" IS RELEVANT TO TIME

One of the definitions of the word Pana can be understood as a particular moment in time or location.[59] This will be the working definition used to understand a Hawaiians connection to place. The Hawaiian sense of place is relevant to time, genealogy or moʻo kūʻauhau. The time frame provides a description of physical place.

The early Hawaiian world view would classify all things associated with the gods to be sacred. This would in turn include all land, as it was created by God and has a spiritual essence. The groundwork of sacred places would be laid out by the initial inhabitants. Fresh water sources, observation points, and other natural phenomenon would become sacred for the perpetuation of life and culture. In the early days, the entire island chain was viewed as sacred as it was birthed by the gods. As time moved on and the relationship of man and land became refined, the emotional experiences with the akua were documented in story and law. Important sites were protected through the use of the kapu system in order to protect the ecological cycles.

2.0.3 WAHI PANA

As discussed earlier, places were described with precise names. The idea of "place" in Hawaiʻi thus holds a greater meaning than just a geographical spot. The wahi pana or legendary places of Hawaiʻi were treated with great reverence. These places carried a spiritual power -- mana. The evidence of mana is exhibited in people through power, strength, prestige, reputation, skill, dynamic personality, intelligence, and in things of efficiency and accomplishment. Mana showcased itself in the, "focusing and transmission of the potency of nature.[60]" According to Edward Kanahele in Van James'

[58] Samuel M. Kamakau. Ka Poʻe *The Works of People of Old. Nā Moʻolelo a ka Poʻe Kahiko.* 1991, 26
[59] Refer to Appendix A2: vocabulary table : Pukui. *Hawaiian Dictionary*. 1986,
[60] ES Craighill Handy, Elizibeth Green Handy and Mary Pukui, *Polynesian Religion*. (Honolulu: Periodicals Service Co., 1927) 26

(*Guide to Hawaiian Archeological Places of Interest*), he describes the concept of wahi pana as a place which ties a Native Hawaiian to their genealogy, a place that merges the physical and spiritual as a link between the past and the future.[61] In a pono, righteous use of wahi pana, one can increase their mana.

At one point in time, Hawaiian society paid homage to numerous wahi pana. Now many of these same places have been abandoned or destroyed. As a result, the opportunity to pass on culture has been degraded. Spiritual wisdom and wahi pana are related through the connection of ʻaumakua (ancestral guardians).[62] Certain areas associated as being domains of ʻaumakua could provide Hawaiians a place to renew their ties to their ancestral genealogy by experiencing hoʻailona -- natural signs or phenomena.[63] To understanding how the Earth was infused with life generating mana, one must see that the earth and life were divine gifts of the gods. The Earth's spirituality was essentially focused within the wahi pana. In order to please the gods, activities on land were done according to the Hawaiian value system and thus did not encourage land or sea resource overuse. The land is not perceived as a commodity; instead, it is the foundation of cultural and spiritual identity of Hawaiians. The land in the region originally settled by their ancestors provides a means to proudly trace their history.

Wahi pana were places were the gods or their disciples dwelled. This included: heiau, temples, shrines, burial caves, graves, observation points, cliffs, mounds, mountains, significant spiritual events, weather phenomena, forests, and volcanoes.[64] The sacredness of the wahi pana followed the hierarchy of the associated gods. The dominant gods or high-status disciple is on a higher level wahi pana than one associated with a lower level god. Kū, one of the dominant gods, is associated with luakini heiaus and temples, while the lesser manifestations of Kū, Kūʻula, are associated with lower level fishing shrines.

Although many wahi pana are associated with geographical areas, there are also wahi pana that are only found when one's mind and soul are ready. For example, Paliuli

[61] Edward L.K. Van James Kanahele, *A Guide to Hawaiian Archaeological Places of Interest*. (Honolulu: Bishop Museum Press. 1991), ix
[62] Edward L.K. Van James Kanahele, *A Guide to Hawaiian Archaeological Places of Interest.* 1991, ix
[63] Davianna Pomaikaʻi McGregor. Hawaiian Cultural and Natural Resource Management. 1995, 20
[64] Kanahele, Edward L.K. Van James "*A Guide to Hawaiian Archaeological Places of Interest*. 1991, x

is a legendary land where the aliʻi children were raised.[65] However, according to Kanahele, it is a place only found when one is ready to receive mana from above.[66]

Following the theme of lōkahi, balance is necessary to live a healthy life. Palua (dualism) is a phenomenon carried through much of the Hawaiian culture, often times requiring the balancing of the seen and unseen world. With Pa, meaning spaces, and lua, meaning two, the word Palua comes from the combining of two. Dualism can be seen in nature: male and female; day and night; heaven and earth.

Wahi pana need protection. This is not only for historical significance, but also for the well-being of the Hawaiian people and culture. The concept of palua applies to the physical and mental wahi pana. When paired with pono or proper management, a healthier lifestyle for both the environment and people of Hawaiʻi is enabled.

2.1 APPROPRIATE LAND MANAGEMENT

"He aliʻi ka ʻāina, he kaua nā kanaka
The land is chief, man is servant.[67]"

The religious origin story (the kumulipo) and genealogical history teaches that to enable a healthier population, proper management of the environment was the kuleana (responsibility) of every person. Proper ethical values and influences from the natural realms aided the process of appropriate land management. The architectural design process used the natural environment to inform shape and the function of spaces. Land and property management were influenced by celestial orientation and Earth based asset planning. Recognition of ecological functions drove the land planning process and management operations. The early settlers were renaissance men and women in their own right. They used their understandings of navigation, health, combat, fishing, planting, and construction to reach Hawaiʻi by canoe. Arguably, this was the pinnacle of Polynesian success. This management principle was carried over into land planning and management.

[65] Refer to Appendix A2: vocabulary table : Pukui. *Hawaiian Dictionary*. 1986,
[66] Kanahele, Edward L.K. Van James "*A Guide to Hawaiian Archaeological Places of Interest*. 1991, x
[67] Pukui. *ʻOlelo Noeʻau: Hawaiian Proverbs and Sayings*. 1983. #531. 62

2.1.1 NAVIGATOR IDEOLOGY

The Hawaiians come from a navigating society. The value system used by Polynesians was directly related to canoe voyaging. One saying says:

> "He waʻa he moku; He moku he waʻa
> The canoe is the island and the island is the canoe."

This is a metaphor of the voyaging canoe. One brings the same respect that one would need to survive on a voyaging canoe to survive on the land. The same Hawaiian values would be carried from the canoe to the land and thus used to control the actions of daily life. The general principles ingrained in these values instilled that land is chief and that man is the servant. This was needed in order to maintain the natural environmental cycles and processes.

2.1.2 HEAVENS INFORM FORM AND FUNCTION

Being exceptional watermen and navigators, it is likely that the original settlement patterns of the Hawaiians followed navigator ideology and practices. Polynesian way finders memorized star movements along the celestial sphere for directional cues and locational markers on earth. To help remember stars in the sky, a navigator would organize the sky into four equal star lines:

1. Ke Ka O Makaliʻi ("The Canoe-Bailer of Makaliʻi) In many Pacific cultures, the high-born stars demarcate a seasonal change with its arrival in the winter skies in the northern hemisphere. In Hawaiʻi, it signifies the arrival of Makahiki or the traditional new year.[68]
2. Iwikuamoʻo ("Backbone") references a series of stars that provide a north-south star line between hemispheres.[69]

[68] "Hawaiian Voyaging Traditions" Accessed March 12, 2014, http://pvs.kcc.hawaii.edu/ike/hookele/hawaiian_star_lines.html.
[69] "Hawaiian Voyaging Traditions" Accessed March 12, 2014, http://pvs.kcc.hawaii.edu/ike/hookele/hawaiian_star_lines.html.

3. Manaiakalani ("The Chief's Fish line") Is the name of the fishhook of the Hawaiian fishing god Kuʻulakai and his son ʻAiʻai. In the Hawaiian sky of Kau (summer season of May to October), Manaiakalani is visible for most of the night, just as Ke Ka o Makaliʻi is visible for most of the night in the sky of Hoʻoilo (winter season, November to April). Manaiakalani is dominated by the navigator's triangle (Huinakolu) in the northern sky and Ka Makau Nui o Māui (Scorpio) in the southern sky.[70]

4. Ka Lupe o Kawelo ("The Kite of Kawelo") Is another name for the Great Square of Pegasus. This constellation has a direct alignment with the star Kūkaniloko.[71]

To help remember the star lines, one would think of them geometrically or as a series of objects. This could be from a curve or bowl, or a line or backbone. More common was a triangle which contains three bright stars called the Navigator's Triangle. Also, a square was used which contains the Great Square of Pegasus.[72]

Along with their extensive natural knowledge of the ocean and sky, Polynesian voyagers depended on help from the gods and spirits. This interconnected relationship of man and spiritual power was prominent in daily activities. The gods were asked to assist in many activities that were both land and sea related. Not only was the interaction between man and nature of religious importance, but it was also what regulated the Hawaiian sense of position and placement in the landscape. Using sun alignments, moon patterns, and celestial locations in relation to the horizon, Hawaiians developed an elaborate system of direction. Sun solstices and moon cycles served as a calendar demarcating different seasons. So, planting cycles were based on the moon. These observances dictated the spatial construct and placement of various built structures.

[70] "Hawaiian Voyaging Traditions" Accessed March 12, 2014, http://pvs.kcc.hawaii.edu/ike/hookele/hawaiian_star_lines.html.
[71] "Hawaiian Voyaging Traditions" Accessed March 12, 2014, http://pvs.kcc.hawaii.edu/ike/hookele/hawaiian_star_lines.html.
[72] "Hawaiian Voyaging Traditions" Accessed March 12, 2014, http://pvs.kcc.hawaii.edu/ike/hookele/hawaiian_star_lines.html.

2.1.3 ASSET-BASED PLANNING ON EARTH

Hawaiians studied the land and the natural elements to become familiar with its features and assets. This traditional ecological knowledge was recorded and passed down through oral history by means of chants, legends, myths, genealogies and place names which include names. Hawaiians used their expertise to take care of these assets.

Knowledge of cultural and natural resources can be obtained by studying the location and construction of traditional Hawaiian sites. Many of the place names, chants and legends are embedded in the construction of traditional Hawaiian homes, temples, and cultivation or irrigation networks. A cultural site is comprised of two areas: the core, and the broader cultural landscape. The core includes the vicinity of land used for residence, practice, and cultivation. The broader traditional cultural practice landscape includes the area for hunting, gathering, or fishing. This broader landscape extends to the ahupuaʻa, or moku boundary. It is the amount of land required to provide for subsistence, cultural and religious practices.[73] Figure 3 shows a map of Oʻahu with the ahupuaʻa and moku boundaries defined. The extent of the cultural boundaries are known by the ʻohana. The cultural boundaries were ways of dividing up the land for both political and environmental benefits.

[73] Davianna Pomaikaʻi McGregor. "Hawaiian Cultural and Natural Resource Management". (Washington DC: 1995), 10

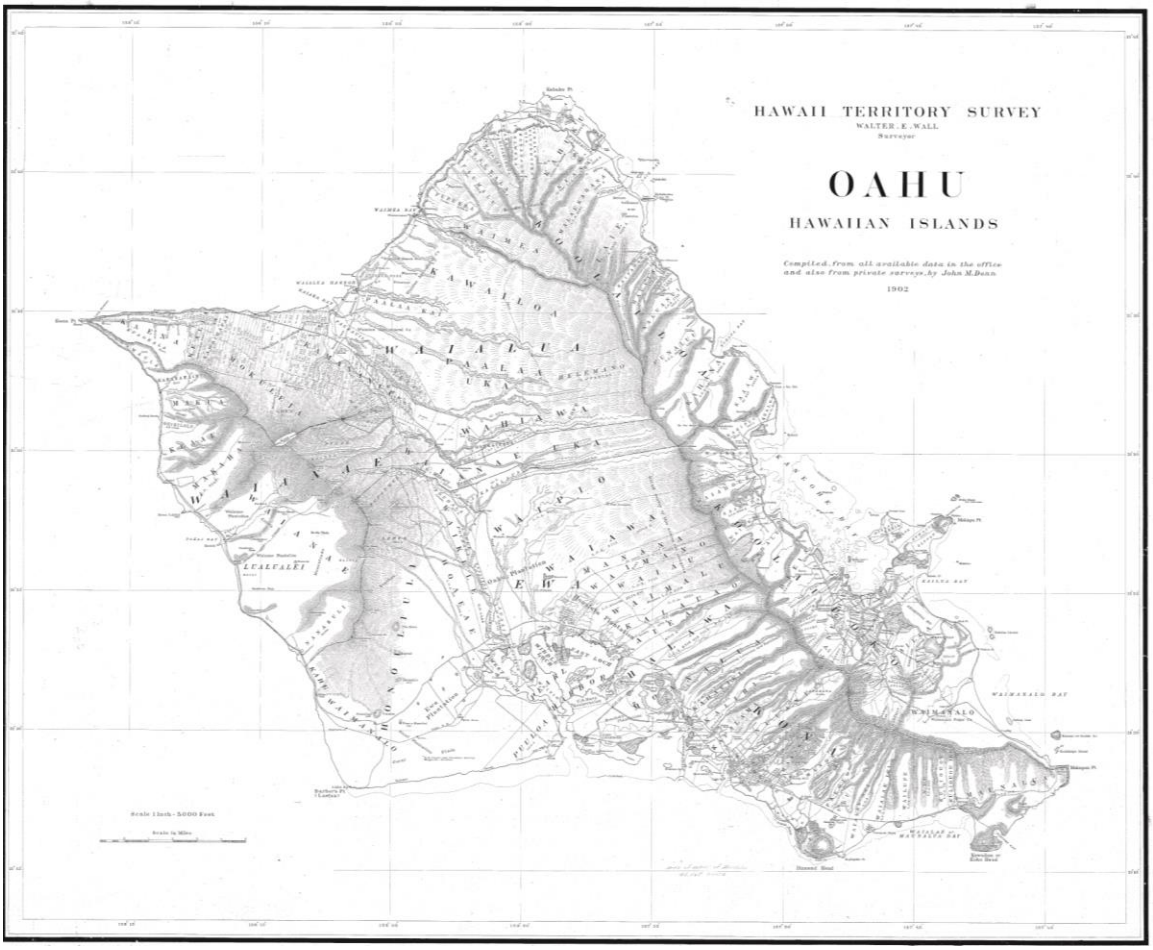

Figure 3: Hawai‘i territory map[74]

2.2 HAWAIIAN NATURAL AND ARTIFICIAL LAND DIVISIONS

Hawaiian land divisions follow natural resource assets including land, air, water and ocean. As these elements are independent, they are also interconnected. The atmosphere affects the land, but the land affects the flowing streams, the water table, and the outlets at the beaches and oceans. A resource highly recognized for its life giving qualities is fresh water. It is considered in every aspect of land-use planning.

Hawaiian naming are often derived from their ancestors. Often, names were given based on a resemblance to someone, or something, or natural element.[75] This

[74] University of Hawai‘i at Mānoa Library. “Hawai‘i Territory Survey Map O‘ahu 1902.” Accessed Mar. 30, 2015. http://magis.manoa.hawaii.edu/survey.html

established the names of land divisions.[76] Places were also named to pass on the name of a chief or famous person of that area.[77] Names were given according to their relation to one another.

2.2.1 MOKU

An island was called ʻāina (place of food) or moku (cut off) because they were separated by the sea.[78] The island chain was called pae-ʻāina or pae-moku (cluster). Islands easily reached by canoe were called moku lele i ka waʻa. Within the island were districts. These were ecological separations of interior divisions called apana (pieces), or moku o loko (interior divisions). Oʻahu had 6 major moku: Koʻolauloa, Koʻolaupoko, Kona, Ewa, Waianae and Waialua.[79] These districts were subdivided into kalana (county) and ʻokana. ʻOkana were again divided into poko (sometimes personal land of chief).[80]

2.2.2 AHUPUAʻA

Access to resources drove the basic unit of Hawaiian cultural resource management. An ahupuaʻa is a section of land that runs from the sea to the mountain and contains ocean fisheries, beaches, kula lands (or cultivatable lands), and forest. The name is derived from the ahu (altar) built at the boundary point of the land that intersects the road used by the chiefs who circle the island collecting taxes paid by those who live within the area. These boarders were demarcated by ridgeline, ravines, stone alignments,

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[75] Kamakau, Samual Manaiakalani, "Moʻolelo Hawaiʻi". Vol 1, Chap 2. P 8. In Sterling Elspeth P., Catherine C. Summers. *Sites of Oʻahu, Bishop Museum Press.(* Honolulu:, Bishop Museum Press, 1986). xi

[76] Kamakau, "Moʻolelo Hawaiʻi". 1997, xii
[77] Kamakau, "Moʻolelo Hawaiʻi". 1997, xii
[78] David Malo. *Hawaiian Antiquities*. (Honolulu: Bishop Museum Press, 1951), 16
[79] Sterling and Summers, *Sites of Oʻahu, Bishop Museum Press*. (Honolulu:Bishop Museum Press, 1986). xi
[80] Malo. *Hawaiian Antiquities*. 1951, 16

vegetation, or the habitat of certain birds.[81] Each division provided sufficient ecological capacity for efficient food production in order for the ʻohana to survive.

The ahupuaʻa land divisions and ecological divisions lend themselves to the understanding that different parts of the land have different significance, purpose and functions within the landscape. Kahuna Kuhikuhipu'uone were highly skilled in reading the environment and its natural ebbs and flows. With this knowledge base, they were able to influence the Chief on how to maintain the balance of the human interactions with nature by locating sites where to build heiau and fishponds.[82]

Ahupuaʻa were described by the court of Hawaiian Kingdom as:

> "A principle very largely maintained in these divisions of territory [ahupuaʻa] was that a land should run from the sea to the mountains, thus affording to the chief and his people a fishery residence at the warm seaside, together with products of the high lands, such as fuel, canoe timber, mountain birds, and the right of way to the same, and all the varied products of the intermediate as might be suitable to the soil and climate of the different altitudes from sea soil to mountainside or top.[83]"

As lands were exchanged due to wars, marriages or other means of expansion, the boundary of an ahupuaʻa or ʻili (land section) developed by the ʻohana, regularly remained unchanged due to the functionality and presence of resources. Instead, entire sections of lands, including whole ahupuaʻa, were exchanged to preserve their integrity.[84]

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[81] W.D. Alexander, "A Brief History of the Land Titles in the Hawaiian Kindgom," Thrum, *Hawaiian Annual*, 1891. 105-106. *Sites of Oʻahu,*.(Honolulu:, Bishop Museum Press, 1986). xii

[82] Donald Mitchell. "Resource Units in Hawaiian Culture." (Honolulu: Kamehameha Schools Press, 1992), 80

[83] Court of Hawaiian Kingdom, In *Re Boundaries of Pulehunui, ahupuaʻa principles of land-use*. (Honolulu: 1879), 239, 241

[84] Jonathan Ching. "Hawaiian Ahupuaʻa Planning Approach :HAPA". (DArch Thesis, University of Hawaiʻi, 2010), 29

2.3 ECOLOGICAL BOUNDARIES

The division of land can be seen through a religious or scientific understanding. Stories explain how the gods touch down on the earth through the clouds and the rain. This is why the upland forests are to be preserved. The realm of man is in the lower elevations that extend out to the sea. Ecologically speaking, each stratum has different roles, and the conservation of the upland rainforests allow for protection of the water shed. Topographic land divisions can be understood through both science and story.

Within the ahupua‘a land division were ecological boundaries. The land was divided up into zones vertically and horizontally depending on the topography. These topographical elements were categorized by different types of climatic impacts to the landscape. The ecological boundaries guided land-use and provided different functions in the Hawaiian community. Hierarchy was placed on different zones due to the level of associated mana within the zone. Where the Earth interacted with the sky was seen as the meeting of Papa, Earth Mother, and Wākea, Sky Father. This interaction happened where the clouds touch the earth, and where the wind and rain strikes down. This interaction describes the hierarchy diagram of the Akua on top and the kanaka maoli, or Native people, below. This means as the elevation of the landscape increases, so does the sacred significance.

As the elevation increases, certain vegetation struggle in their effort to survive. For these reasons, the range of levels in topography determined what natural resources existed and their specific purpose. All matter that flourishes in high elevation regions are regarded as sacred because they are capable of existing at such harsh circumstances.

2.3.1 TOPOGRAPHICAL STRATUM

The large central peaks or ridgelines of an island that travel the extent of the valleys were called kua hiwi (backbone).[85] The broad plateaus between peaks and ridges that are difficult to access were called kua lono. The kua lono elevated above the clouds. Thus having little human interference and high mana. The craters were called lua pele or

[85] Elbert 1986; David Malo. *Hawaiian Antiquities*. 1951, 16

kua pele.[86] Below the high part of the kua hiwi was the kua mauna. This was the belt connecting the side of the mountain with the rounded swell topography.[87]

The lines of vegetative growth often delineated these boundaries.[88] Certain plant types served as indicators for various zones.[89] The kua hea was the first belt of small trees stunted by high elevation. Below was the larger tree forest known as the wao, wao nahele, or wao eiwa. Wao is a general term given to the natural wild forest. It is the home of the gods that were often uninhabited. Within the wao are many intricacies and subcategories. The first was the wao ma‘ukele where the biggest trees grew. Second was the wao akua (realm of the gods), followed by the wao kele (rain forest), wao kanaka (realm of man), and wao lā‘au (realm of plants).

2.3.2 WAO AKUA

The forests and shrub lands of the upper regions remained largely unmodified by humans. The wao akua is the realm where man had little impact on the natural environment and plants thrived without human interaction. In this region, conditions remained wild. This was believed to be the dwelling place of the deities. This is where Hi‘iaka, sister of Pele, encountered violent weather and powerful mo‘o, guardians and where Kamapua‘a, demigod, would hide in the fern thickets. The wao akua was a place to be avoided. It was the hideout of cannibal chiefs such as ‘Aikanaka. According to the chant of Kuali‘i, the wao akua was too wet to be traversed wearing kapa malo (indigenous garment). One would need to change into ti leaf garments when passing through.[90]

Hawaiians recognized a dichotomy between different ecological zones. One of the basic kapu was the sacred religious restriction of behavior protecting the upland forests. Hawaiian society incorporated short and long term self-imposed societal restrictions with the natural systems that support life. The restricted access was only

[86] David Malo. *Hawaiian Antiquities*. 1951, 16
[87] David Malo. *Hawaiian Antiquities*. 1951, 17
[88] Beckwith, Martha Warren. *Kepelino Traditions of Hawaii*. (Honolulu: Bernice P. Bishop Museum Bulletin. 1995), 8
[89] Malo, *Mo‘olelo Hawai‘i*, 1951,, Handy, *Native Planters in Old Hawai‘i*, 1991.
[90] “Wao Kanaka with Dr. Sam ‘Ohu Gon” accessed Mar. 13, 2014
http://www.spreaker.com/page#!/user/bishopmuseum/wao-kanka-with-dr-sam-ohu-gon

violated with great need or proper protocol. Accessing the upper regions, wao akua, would require great sacrifice and intensive planning. Only a few Kahuna Nui were allowed access to this region and were the stewards of this area of the land. With very few structures built in this location, only shrines, burials and heiau are found. People would only access the wao akua for ceremonial purposes, or for selection of resources required for large canoe building or the construction of high status structures. All zones above the wao akua were dedicated to the gods.

2.3.3 WAO KANAKA

Below the wao akua was the wao kanaka. This was the lower inland region where the people populated. Most of the vegetative resources were grown in the wao kanaka, where there were less kapu guarding activit. All zones below the wao kanaka were associated with people. This is where the land begins to become hard, or apaʻa, near the belt of ʻilima (*Sida fallax*) plants. [91] The kula sloping plains, open country, or the lower forest, runs to the shoreline, (kahakai). Kula is separated by the upper plains, ko kula uka, and the lower plains, ko kula kai. Here, the oldest soils are found and the most accessible plants and food crops that require little amounts of water.[92] Pili grass (*Heteropogon contortus*)[93], flowering plants, medicinal herbs, shrub trees, food crops could all be harvested in the wao kanaka.

During the colonization era of Hawaiʻi, Hawaiians transformed the ecology of the islands greatly. The introduction of species like the rat helped to increase these changes. However, at this time, even with intensive deforestation efforts and fires, the native species would grow back. Most of the introduced plants required intensive maintenance and could not persist in the environment without the care of humans. These transformations happened within the wao kanaka, an area grown by human effort.[94]

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[91] Native Plants Hawaiʻi, last modified 2009, http://nativeplants.hawaii.edu/plant/view/Heteropogon_contortus

[92] Handy, *Native Planters in Old Hawaiʻi,* 1991, 164

[93] Native Plants Hawaiʻi, last modified 2009 http://nativeplants.hawaii.edu/plant/view/Heteropogon_contortus

[94] "Wao Kanaka with Dr. Sam ʻOhu Gon" accessed Mar. 13, 2014 http://www.spreaker.com/page#!/user/bishopmuseum/wao-kanka-with-dr-sam-ohu-gon

2.3.4 VERTICAL SPATIAL BOUNDARIES

Traditional boundaries continued from below the ground plane to the atmosphere. The parts attached to the earth and soils below was called ka paʻa i lalo. The area where contact is made with the earths' surface is the lewa hoʻo makua. The area just above the ground to the bottom of a tree is haku a lewa. The area just above the head is luna aʻe. The area which small birds dwell in the top of the trees is the lewa lani lewa. This is broken into the lower luna aku, and higher luna loa aku. Above this region is the lewa nuʻu, where larger birds fly and the clouds move. The lewa nuʻu lewa is divided into four strata. Starting with the lowest is luna lilo aku, then luna lilo loa, and then luna o ke au. Finally, the highest stratum of the clouds is the kea au ulu. The ring of space above Earth's atmosphere is ke a po a lewa, or ka lani uli (dark blue sky). Above ke a po a lewa is kamaka ku i kahi lewa, the sky just above the zenith. The highest stratum of space above the clouds is lewa lani lewa. Finally, the realm of the sun and stars is ka lani paʻa.[95] Spatial adjacencies were in multiple axis and required a holistic way of understanding the environment. Figure 4 helps to explain the relationship between spatial elements.

[95] Malo. *Hawaiian Antiquities*. 1951, 12-13

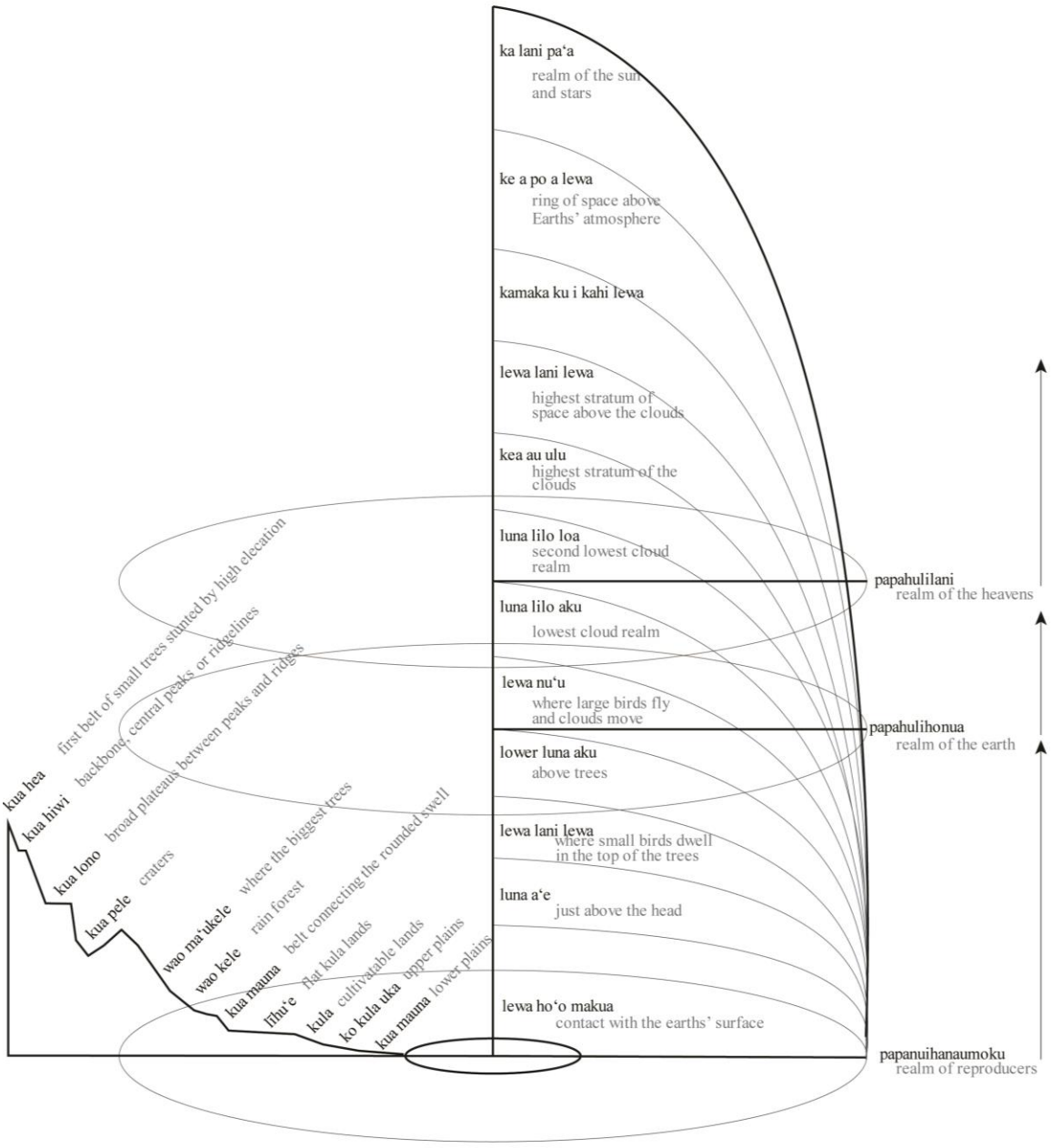

Figure 4: Spatial strata diagram

2.4 WAHI KAPU

Wahi Kapu is a physical node along the lifeline of wahi pana. As a subset of wahi pana, wahi kapu are classified as sacred places that had great ancestral mana. Hawaiians honored these wahi kapu for it is believed that their resources are divine gifts from the gods[96]. When high status wahi pana were needed, wahi kapu were created. Wahi kapu were places of royal sacredness that were off limits to makaʻainana. The Wahi Kapu location was determined by religious connection to cultural resources. Thus, they could be found in the Wao Akua or the Wao Kanaka.

In applying appropriate land planning, management on different scales is required. This includes large scale planning for an ahupuaʻa or moku down to the small scale planning of a wahi kapu. Traditional wahi kapu boundaries have the potential to include the entire ahupuaʻa or moku. However, in this part of the dissertation we will describe the wahi kapu as the core of the cultural boundary as opposed to including the broad cultural context.

2.4.1 FUNCTION

> "Heiau (sacred sites) were large national temples used for ceremonies by the aliʻi (highest order of chiefs) and their kahuna (priests). Others were koʻa, small structures perhaps built by makaʻāinana to secure bountiful harvests from the land or sea, and still others to encounter rainfall. Some were undoubtedly places of quiet prayer and reflection, while others were scenes of large ceremonial hula performances. Still others were no more than simple shrines where family members appealed to their ʻaumakua for guidance."[97]

The meaning of heiau in contemporary times is a "pre-Christianity place of worship." The term heiau is understood by the joined meaning of the two words in which make up heiau: hei and au. Hei comes from heihei which refers to "catch". In the

[96] Van James. *Ancient Sites of Oʻahu*. (Honolulu: Bishop Museum Press, 2010). X
[97] Jan Becket and Joseph Singer. *Pana Oʻahu Sacred Stones, Sacred Land*. (Honolulu: University of Hawaiʻi Press, 1999), VIII

alternate pronunciation haiau, hai refers to "sacrifice." Au is defined as "flow" or "waves, or movement of phenomenon." Therefore, the meaning of heiau is associated with "the flow or transference of mana."[98] The heiau serves as a platform for which deities can communicate with man, or where man takes cues from nature. In the study of heiau today, a common assumption is that a heiau is a human-built structure that is rectangular in form. However, there are some sites that do not match this stereotype, like terraces, enclosures, walls, mounds or upright stones.[99] Heiau characteristics refer to functions instead of physical form.[100] However, it is true that some archaeologists compare similar traits in remains to characterize heiau location and type. The research in this portion of the dissertation focuses on the site analysis and natural characteristics that are taken into consideration during the decision making process of a kuhikuhipu'uone prior to informing an ali'i.

2.4.2 FORM

Heiau were planned out by a special architect kahuna, the kuhikuhipu'uone. Aligning of a new heiau with a pre-existing heiau or sacred place was certainly possible. When deciding on the location of a heiau, the kuhikuhipu'uone would inform the ali'i based on the interpretations of signs and omens while observing the weather.[101] The location of the building of any particular structure (especially those of high status) depended on celestial and natural elements, resource location, quality, and abundance. Together with accessibility, relation to other natural and man-made arrangements and spiritual energy connection are experienced. The kuhikuhipu'uone were genealogist, and environmentalist who would incorporate the location of water sources and other key factors for their site analysis and design of a structure.[102] In order to arrange the spatial layout of the heiau, they first must understand the relationship to the land, ocean and

[98] Becket and Singer. *Pana O'ahu Sacred Stones, Sacred Land*. 1999, XX
[99] Becket and Singer. *Pana O'ahu Sacred Stones, Sacred Land*. 1999, XIX
[100] Becket and Singer. *Pana O'ahu Sacred Stones, Sacred Land*. 19991999, XXI
[101] Kamakau. *The Works of the People of Old: Na Hāna a ka Po'e Kahiko*..1991, 7
[102] Kamakau. "Ka Mo'olelo o Na Kamehameha", (Ka Nupepea Kuakoa, December 28, 1867): Buke VI, Helu 52.

celestial orientation of the site.[103] Heiau follow the movements of water and fire. Fire includes the movements of the sun. Heiau were often located at places where mana of papahulilani (realm of the heavens) and papahulihonua (realm of the earth) intersects papanuihanaumoku (realm of reproducers).[104]

2.5 WORKING FACTORS IN LOCATING WAHI KAPU

The cultural landscape of traditional sacred places are emphasized and described in moʻolelo of the natural features (winds, stones, mountains) and their associations with deities and people. The Hawaiian cultural landscape also included the man-made features such as fields, houses, religious places, and burial locations. Wahi Kapu are valuable pieces of land that connect the physical and ethereal truths of Hawaiian spirituality. Fostering a connection between man and land at a wahi kapu is formed on the basis of manipulating culturally charged natural and man-made resources.

2.5.1 PAPAHULILANI: HEAVENS (COSMIC)

The origin of Hawaiian spirituality is embedded in the Sun, Moon, stars and heavens. Polynesian navigators brought with them the stories of the gods as they were imbedded in celestial alignments.

2.5.2 VISUAL GEOGRAPHIC GEOMETRY

Relative to the natural topography, observation and vantage points in a cultural landscape allow a range of vision which can be natural, designed, or controlled. Navigation outlooks on both land and sea are used to observe weather patterns and security. In traditional times, warrior outposts were constructed at areas with favorable views of the environment. In addition, several neighboring sites are celestially aligned. A complete understanding of the topography and celestial bodies are considered in

[103] Bantolina. "Moʻokuauhau Ko Hale Kui Maoli, Genealogy of a Living Manifestation of Hawaiian Architecture" (DArch Thesis, University of Hawaiʻi 2012), 37
[104] Kaiwi Nui Yoon. "Architecture Landscape" (presentation, Architecture 451, University of Hawaiʻi, Mānoa Feb, 12, 2012).

analyzing the views and vistas of an area. Konohiki, the natural resource managers of an ahupua‘a, would commonly oversee production and work allocation in an area at a particular vantage points. In some cases, their houses may actually be placed at this vantage point for optimal supervision.

2.5.3 AO (CLOUDS)

Clouds were very important indicators in the sky. They could be read to inform on possible high winds, storms, or calm weather. They were named for their appearance and characteristics. Color, location in the sky, shape, and groupings were all informants of future weather conditions with its particular name correlations.[105]

2.6 PAPAHULIHONUA: EARTH ECOLOGY

Where the heavens come in contact with the earth was seen as the realm of the gods. The literal translation of Papahulihonua is where the heavens penetrate the Earth, giving life to all things on Earth. These areas of contact were seen as significant places on Earth where appropriate behavior was to be had.

2.6.1 MAUNA (MOUNTAINS)

The mountains were the interface between Earth and the sky. This is where the clouds gathered and watered the Earth with rain. The mountains were viewed as landmarks when viewing the islands from the ocean. Mountain peaks, ridges, and valleys were all given precise names.

2.6.2 UA (RAIN)

Rain was a very important phenomenon believed to be started by the steam created within the Earth. Scientifically, this is evaporation leaving the Earth to create

[105] Malo. *Hawaiian Antiquities*. 1951, 12-13.

clouds which supply the Earth with rain water.[106] Different types of rain had different names dependent on the amount of water and direction, inherently tied to wind.[107]

2.6.3 WAI (WATER)

Water is a key factor to survival and sustenance. Water defines wealth. The word for wealth in Hawaiian language is wai wai. Control over water enabled prosperity. Water came from the heavens in the form of rain and also from the Earth in the form of springs. Streams and springs provide important hydration for food resources, habitats of native species, and important resource for domestic uses. Water was carefully irrigated and cautiously maintained to ensure the nourishment of the land and people. Changes in the water table would result in different actions to take place. Irrigation by natural streams and manmade diversions required an intimate understanding of the natural topography. The construction of agricultural terraces and gardens needed to also manage erosion control. Retaining walls and certain vegetation were used to help strengthen the soil surrounding area from eroding.

Water features are designed for functional purposes rather than aesthetics. A popular example of this irrigation is a loʻi -- fishpond. Here, the loʻi and the fishpond act like kidneys, filtering the water before it enters the ocean. In essence this system of land management is for the sake of ocean management.

The ocean shoreline, reefs, near shore and offshore waters provided another resource for food gathering and medicine. Many cultural and spiritual customs were performed regarding the water resources.

2.6.4 KAHAWAI (STREAMS)

Streams were the lifeline of Hawaiian society. They helped shaped the landscapes and to irrigate the crops. Management of the stream was very important. Pollution above the agriculture lots would carry sickness to the people who ate the crops. Mismanaged streams would cause poor harvest in the loʻi and the fishponds.

[106] Malo. *Hawaiian Antiquities*. 1951, 12-13.
[107] Malo. *Hawaiian Antiquities* 1951, 14.

2.6.5 LĀʻAU LAPAʻAU (PLANTS/ MEDICINAL)

The forest was not only important for gathering food, but it was also a storage bank of ceremonial adornments, ritual offerings, and medicine. Plants such as kī (ti plant) and noni (Indian mulberry, medicinal shrub) indicate the location of sacred places. This is a link created through the people who propagated the plant there in ancient times and now. Ti does not self-propagate. In order to grow it, it must have been planted.[108]

2.6.6 ALA HELE (ACCESS)

Trails allowed access to cultural resources. Interconnected pathways from the upland forests, down the streams, to the ocean provided a means of travel for Hawaiians.

2.6.7 KAI (OCEAN)

The ocean was a very large resource. It was the means to travel back to ancestral homelands and a refrigerator full of resources. Food, medicinal and utilitarian resources could all be found in the ocean. Access to the ocean was both physically and mentally beneficial.

2.6.8 MAKANI (WIND)/ACOUSTICS

Winds had many names. Each island often had multiple names for the same wind.[109] The cardinal direction of the source of the wind and the associated weather that came along with these winds were named. Winds responded differently to different landscape features. Wind coming down the mountain towards the ocean, had a name, while the sea breezes that come off the ocean towards the interior of the island have their own. The name of winds in different locations around the island also has their own individual names.[110]

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[108]Isabella Abbott. *Lāʻau Hawaiʻi: Traditional Hawaiian Uses of Plants*. (Honolulu: Bishop Museum Press, 1992), 42.
[109] Malo. *Hawaiian Antiquities.* 1951, 12-13.
[110] Malo. *Hawaiian Antiquities.* 1951, 14.

2.7 LESSONS LEARNED FROM TRADITIONAL HIERARCHICAL RESEARCH

Hierarchy of society and ecological cyclical relationships constitute culturally charged locations. At these different places, people are required to act different and humble ones' self. Over the process of time, sacred places evolved due to changing societal needs, beliefs, and environmental conditions. The wahi pana and kapu lands demarcated by different realms of influence are valuable pieces of land to the Hawaiian community and the ecology. Protection efforts should be afforded to the management of these legacy lands.

A holistic understanding of all the natural elements, as well as the understanding of the intricacies in the relationships and processes of them, was a large part of the planning and decision making process for Hawaiian architecture. A large portion of the design process was front loaded with the intimate understanding of the sites and all the acting players. Natural phenomenon determined the actions of man in these areas of wahi pana. Where high status wahi pana were required to be protected, wahi kapu were created. Wahi kapu were places of royal sacredness and off limits to maka'ainana.

CHAPTER 3:
CURRENT CONTEMPORARY INTEGRATION STRATEGIES

3.0 READDRESSING THE GLOBAL PARADIGM

Architecture has always included shifting perspectives of the world which can be classified as physical expressions of the society. Architecture is the median between our mind, body and of the world. In this way, architecture connects man to nature. The way in which we go about cultivating the landscape reflects society's overarching values. Through architecture and landscape design we can see the differences in how the pressures of society affect our values. Ecologically responsive designs express cultural and physical values of regions with mutualistic relationships.[111]

Since humans started separating themselves from food production the general trends of "wasting" and consumption has persisted.[112] During the 16th century in Europe, people built large walls surrounding their cities for protection against invaders. The walls were necessary during this time because many of the surrounding countries of the area had like-minded mentalities of dominance, power, and conquest. Later, during the renaissance period, mans' control over nature was expressed by taking snap shots of beauty. For example, Baroque French gardens were characterized as static and inflexible. These expensive gardens were political status symbols which showcased man's power over nature. The colonial perspective deteriorated the connection to landscape which they viewed as wild or unsafe or something that needed to be tamed.[113] These actions show a global paradigm shift towards, "Man as chief, land as servant."

To oppose this global paradigm, the inclusion of indigenous values in design will provide a base from where we can regenerate a prosperous relationship between society and nature. The balance is found in the cultures that showcased ingenious problem solving during times when limited resources were available. This enabled them to establish a relationship between themselves and nature. The new effort touches on the

[111] Kenneth Frampton, "Seven Points for the Millennium," (*The Architecture Review*, November, 1999).
[112] Rachel Kaplan, "The Prehistoric and Preindustrial Deforestation of Europe." (*Quaternary Science Review*, 2009), 3021.
[113] Anne Spirn, "The Language of Landscape", (London: Yale University Press, 1998), 85-101.

hope for sustainable living. With his, we can move towards changing the way in which man thinks and reconnect with nature.

3.1 WHY IS CULTURAL INTEGRATION IMPORTANT?

It was not until 1970 when people developed anti-establishment type feelings from the Vietnam era. People in Hawai‘i began to question the American system, land ownership in Hawai‘i, the military, and the impact of foreign investors. Hawaiians recognized the dangers of development and protested rural development. The state was in a state of social unrest. A kind of cultural renaissance began the revival of beliefs, practices, and traditions that provided an alternative to capitalism. The expression of hula, music, chant, language, navigation, and metaphors like “aloha ‘aina, mālama ‘aina” once again would guide people on how to act, live, and relate to the environment.

In the 1980’s, there was a nationalist movement throughout the Pacific. People started to recognize the political and economic power that had been taken from Hawaiians and the need to once again reclaim the resources of the land. Educating the youth about traditional cultural beliefs and practices became a paramount task. This initiated the decolonization process. The first steps towards reaching the end goal of sovereignty.[114]

The negative effects of culture loss can disable a culture to fully flourish over time. One effect is the economic and political powerlessness of the subordinate culture. The indigenous Hawaiian culture conformed to the culture of European colonizers. These European colonizers exploited Hawaiians and the environment for personal and financial gain. This stress of culture loss has passed down to family and to children resulting in unhealthy eating habits and health disorders like obesity, diabetes, and heart attacks. Another negative effect is the psychological degradation of cultural value. Hawaiians began to lose their sense of pride in being Hawaiian and began to adopt the foreign cultural beliefs. The resurgence efforts of the cultural renaissance aimed to develop pride, ha’aheo, self-confidence, and enhance self-esteem. A third effect was the loss of the traditional Hawaiian value system, and the relationship people had with each

[114] Robert Agres. “The State of Economic Development in Hawai‘i – A Community Based Economic Development Perspectives” (Maui: Conference Workshop, 1994)

other and the land. This can be restored through the physical aspects of hula, language, protocol, cultural arts, and the preservation of sacred places that give Hawaiians a sense of identity.[115]

The reclamation of Native rights (ie: water rights, gathering rights, burial and religious practices) all help to restore traditional Hawaiian ways. The freedom to exercise these rights and preservation will allow the transmission of knowledge to future generations that connect them with their ancestral and cultural identity.

Design process must consider native beliefs and customary practices in order to protect them. Development can be slowed by community objections. Thus, the architect's role is to bring up community concerns early in the design process so the community will object less. Potentially, community input could add to the project's strength. To do this, one must understand the history of the people and the land, and the potential effects of developments on the land.[116] An architect who has become educated in the sovereignty movement could be a great asset to Hawaiians and ʻāina.[117] My proposed process aims to further the sovereignty movement beyond self-reliance by combining the knowledge of past and present to face the changes of the future. By using the tools of today such as education, books, and literature we can apply a traditional and contemporary understanding to both people land. According to Sitiveni and Halapau, this understanding is changing the idealized market from a consumer/commercial society to one that is more respectful with an emphasis on self-sufficiency and sustenance.[118]

[115] Anthony Hooper and Sitiveni Halapau, "Social and Cultural Aspect of Resource use and Development." (East West Center, W.P Pacific Islands Development Series No. 4, July 1994).
[116] Jerrlyn Senebau. "The Role of a Planner in the Decolonization Process of Hawaii". April 6, 1995
[117] Bonnemaison. "The Political and Economic Dimension of Planning. De-colonization, National Building and Sovereignty, Hawaiian Sovereignty. Sustainability and Economic Development in Pacific Island Nations." 1989
[118] Sitiveni Halapau. "Sustainable Development: From Ideal to Reality in the Pacific Islands" (Honolulu: East-West Center Pacific Islands Development Program June 24-26, 1993) 12

3.2 Analysis of Contemporary Process & Philosophy

Some of the firms are labeled generically because their media release form was not completed.

3.2.1 Company A

3.2.1.1 Goals

With a passion for honoring the host culture of Hawai‘i, the Chairman of the architecture firm Company A, aims to find timeless solutions that preserve and extend cultural assets. During his time in academia, the Chairman recognized the benefits of regional architecture and the opportunity for nation building in his home, Hawai‘i. The Chairman accredits much of his success to God. The values of his Christian faith thus help to guide his architectural decisions.

3.2.1.2 Philosophy

For architecture to feel appropriate in Hawai‘i, cultural integrity must be prioritized. In every project, the goal is to look to the host culture and derive the desire of the people. Whether it be geography, landscape, stories and mo‘olelo each project is different. The ultimate decision is up to the designer to decide which they are going to give the spotlight to? Working closely with the client, architectural focus is set in the culture. A good design starts with your spirit and how well you respond to the information given to you.

3.2.1.3 Process

One of the Company A team is a Hawaiian cultural practitioner, who is on his way to becoming a kumu hula. With a Hawaiian fluency and planning background, he was able to translate many of the cultural values in to a Tahiti design project. With his skillset, Company A was able to build into the framework of the project a cultural history of chants, writings, and celestial understanding. Ethno botanical studies, kūpuna

knowledge, and local expertise helps to develop an understanding of the natural site and ahupua‘a to better feed into the design.

Company A studied the culture and used their understanding to convey the past in a way that meets the future needs of the place. The economic and cultural understanding of the place makes the project viable for the long run.

3.2.1.4 CRITIQUE

Company A has proven their ability to design in Hawai‘i. Their projects have been accepted by the community because of their incorporation of culture into the design. Looking to the site for inspiration allows the design team to strategically set the building into the landscape. Choreographing the flow of people through the architecture helps frame the views of the surrounding landscape which establishes a connection between the experiencer and nature.

3.2.2 COMPANY B

3.2.2.1 GOALS

A. FIXING SPACE

The team at Company B created a design process called “fixing space”. Through intensive research of existing literature, their goal is to integrate thoughts and knowledge in order to create space (or any type of design project) from architecture to a children’s book. This strategy stems from the origin of written language in Hawai‘i. When the missionaries introduced the written language, it served as a way of creating a “fixed space” in the mind. At the turn of the 19th century and the advent of the printing press, Hawai‘i had the highest literacy rate in the world. Hawai‘i was printing works like the Bible and Moby-Dick. These books were read cover to cover by many Hawaiians that could get their hands on a copy. Written word was seen as a form of “magic”, or a way to transfer knowledge to a physical form. The tradition of passing on knowledge has now become the kuleana of the professional architecture.

B. KULEANA

Kuleana can be understood as a calling. This can be determined by your natural gifts, your skill set, and passions. Architects of today are thus challenged to use their talents to fulfill their kuleana. The architect must use his or her ability to act as the ʻaina/community liaison. This includes fighting for community assets when dealing with developers. Company B feels we need to always fight for the environment and return it to a balanced (pono) state. One of the catch phrases of their projects was, "Rooted in culture. Beneficial to the ecosystem. Uniquely Hanalei." Standing up for the ecosystem will bring the ʻAina-Kanaka relationship closer.

C. LEGACY

The final project of any architect should not be based on fame or ill intentions, but rather a legacy of hope for future generations to enjoy and be proud of. This legacy should pass on both knowledge of Hawaiʻi and values of the generations before us to perpetuate a harmonious relationship with the land and each other.

3.2.2.2 PHILOSOPHY

Architecture can be a narrative of the landscape. Through the research of existing literature, thoughts, and knowledge, architects can create a space that eloquently fits its environment. Inherently architecture becomes a physical representation of the genealogy of the space. The traditional architect, kuhikuhipuʻuone, would identify, create, and prescribed spaces for spiritual connection. The role was to link the kanaka with the akua through physical space and ceremony. Akua existed in the realm of natural forces; thus, connecting man to these natural powers was held important.

Moʻo kūʻauhau is the term for genealogy. The root Moʻo means succession, series, lineage, story, tradition, or legend. ʻAuhau is a tax, assessment, price, or charge which were used to measure and document oneself rank and history in society. Genealogy is a way of fixing ones in space and time. In order to make a stand, one must invoke genealogy in order to create a meaningful design

3.2.2.3 PROCESS

The approach of Company B starts off similar to most; however the depth of research is much increased. The initial process begins with studying people, stories, site history, and cultural practitioners of the area. Most firms base their research off of the cultural assessment reports; however, this is just a starting point that Company B uses as the base of its research.

The next stage is unique to Company B. A series of overlay maps are created and laid onto the landscape. Each map identifies landmarks, events, deities, ʻoli, mele (song), or anything that could provide any cultural information relative to the project. The maps are put into three comprehensive periods: 1) from the time up till the Great Māhele (division). 2) From the Māhele till now; and, 3) from now until 7 generations into the future. The maps are used to develop an understanding of the assets within the ahupuaʻa. Outlining the guiding principles helps to create a plan for efficient management.

After analyzing the maps, the team deciphers a list of key factors specific to the site and the task at hand. These key factors will influence the final design. They could be ecological or cultural drivers. In developing these drivers, the goal is to think about what came first, which is more important, and to establish a priority. For instance, the water cycle could be a key design driver over the existence of a historic building. One could ask, what came first, a 50 year old building or a natural stream flow paired with a fish pond? An epic story or moʻolelo that is based on the site could also influence a design; therefore, perpetuating a story of place through the design aids in perpetuating the culture and ecology. One Company B project was based on the story of Kuʻulakai, Hinapukui, and Aiʻai which tells of how Kuʻulakai taught fishing to the people at this location. The skin of the building represents a fishing net and three vertical towers stand for each person in the story. One horizontal tower represents the coral reef where Hinapukui and the wāhine would gather fish from the ocean. Early in the design process, the mission is to emphasize the story. This is to keep the design from getting chaotic. Being consistent with the story and using it to shape all elements of the design will give a clear brand to the project.

Being able to connect the project on a personal level to a user with no previous cultural knowledge is a way to measure the success of the project. The user might not

know the story before of ‘Ai‘ai. But, if the architecture can help them learn it while living there, then the knowledge of Hawai‘i is passed on. One of the goals of Company B is to create a legacy by passing on the knowledge and values of Hawai‘i. This includes keiki and visitors alike.

As in many Hawaiian thoughts there are often many kaona. Hawai‘i was an oral culture, and the language was very poetic in nature. The same thing could often thus have many meanings. One objective Company B has is to learn as many kaona of a story, person, place or thing as possible in order to better understanding and design. The original meaning may not be known and the true meaning might only be known by the original author. This creates a very personal process of understanding and an interesting relationship between designer and experiencer.

The goal is to align the project with the client’s needs. The triple bottom line is to make sure the project accounts for economic, environment, and social needs. Every project is different and the matrix of the triple bottom line can be adjusted per project accordingly.

3.2.2.4 CRITIQUE

Company B has developed a strong process for design. They take personal responsibility and aim to develop design strategies based on Hawaiian values. Front loading the design process enables many ideas to be integrated into the final design. Many of the projects are reflective of the conceptual ideas that drove the project.

3.2.3 COMPANY C

3.2.3.1 GOALS

Company C is a well-known architecture firm in Hawai‘i. They aim to magnify the glories of Hawaiian culture through an understanding of the economic value of cultural richness that Hawai‘i has to offer to the rest of the world. Hawai‘i has a unique opportunity to create an architecture environment with an urban design perspective that preserves views of a pristine environment.

3.2.3.2 PHILOSOPHY

A. HIERARCHY

The architecture in Hawai‘i is a reflection of society and economic situation. Hawai‘i had broad agriculture land and a history of a well-developed status conscious society. This was a society ruled by kings and with an economic system based on taxed food production. The traditional system put emphasis on valuable productive lands. In comparison, Papua New Guinea and the Marquesas have a landscape of narrow shaded valleys that fostered more of a democratic society. Hawai‘i’s society consisted of a hierarchy of people from royal kings down to the lowest wanderers.

This hierarchical relationship was expressed in the architecture. Under each roof of traditional structures was a singular program function. Only the high chiefs could have a high roof. A flat roof symbolized lower status. It took lots of time and materials to construct a structure with a high roof; thus, this was reserved for the higher ranking people in society.

B. METAPHOR OF COOKING

To the Company C Principle, architecture is like the fine art of cooking. Each project is a special mix of spices brought together to create excellence. Each spice represents a design element or design decision. The architect acts like the cook to create a special individual blend with the purpose of capturing an emotional space or experience for the user. The public’s emotional response is similar to the response of the consumer to the chef. The architect’s design could prompt design discussions between chef and chef.

C. ARCHITECTURAL ENVIRONMENT

Traditional Hawaiian architectural perspective was different than our perspective of architecture today. Architecture back then was focused on creating an architectural environment. When architecture was focused on production, Hawaiians used engineered terrace-wall structures. In contrast, simple hale, or houses, were used for processing agriculture produce. The noted architecture was of stone mason work.

D. GARDEN OF EDEN

The Principle shared a quote from Mike Barnes that stuck with him when designing, "the Pacific is the garden of Eden, no need for a building." In Hawai'i, we talk about the environment and how it is conducive to the needs of human comfort. The need to condition a space is done naturally by the trade winds. The only protection we really need is from the sun and the rain, which can be provided by a tree. This recognition of the natural environment can be addressed through the preservation of the view axis. At one point in time, the view axis shaped the formation of quads and courtyards; however, today we have switched these roles.

E. MAGNIFY THE UNIQUE

Successful architecture in Hawai'i should tell the story of history and culture, and magnify the uniqueness associated with the place. Company C looks to incorporate associations with royalty and hierarchical society. Hawai'i had the longest lasting sovereignty in the Pacific. King Kamehameha the Great united the islands and interacted well with Western powers. King Kamehameha V further bolstered Hawai'i's economy by building lighthouses to aid ships navigating around harbors.

F. ARCHITECTURE PROGRESSION USING LANDSCAPE

Modern architecture is based on progression; always searching for new ways to innovate the design process and products. The Principle feels as though landscaping which helps shape space can be used more integrally with architecture to create emotional experiences with the users. For example, Hawaiian site features created by man to provide a connection to nature through planted landscapes. The Principle discussed how to use a coconut grove on a diagonal grid to define a space that responds to the built environment. These ideas are not endemic to Hawai'i. Persepolis in Iran utilizes a similar phenomenon using palm trees.

In a typical project today, 1 to 2% of construction cost is spent on the landscape. Money that can be saved is realized with an efficient structural system. The Principle asks, "If we can save more than 1-2% in the structure, then why don't we put more money into designing the landscape?"

3.2.3.2 PROCESS

According to the Principle, the process starts with understanding the needs of the program. Once a room schedule is created, one can start applying high, mid, and low status classifications to the spaces. This process is similar to the philosophy and process of Louis Kahn that creates servant and served spaces. In order to showcase cultural importance, a designer could magnify differences where ever possible. Some design elements include high ceilings for high status spaces and low ceilings for low status spaces.

Conceptual development aims to highlight the culturally significant or unique features of the project and the site. It behooves the designer to bring these aspects to the forefront of site plan. However, economics do not always support making high status spaces the largest floor area. This would just be too expensive for most projects.

When creating the design, it is important to take into consideration the modern setting and how the building is going to fit into the context of the location it is built in. Commercial centers and big box stores are 90% flexible space, with 10% local cliental market design language on entry ways. The Principle called this strategy thinking in 3-D. How will the urban design perspective view plane see the building from the street view? How will the building fit into the site? These are questions regarding the life of the community that must be addressed by the architect.

A. CULTURALLY CHARGED MATERIALS

"Culturally Charged Materials" was another key term often referred to by the Principle. The people of Hawai‘i have developed a connection to certain materials, especially materials with cultural significance. Ubiquitous materials such as concrete, glass, or grass have little cultural significance. Traditionally, people in Hawai‘i did not build using these materials. Hawaiian laborers were highly trained in using stone, wood and thatch. In order to highlight the unique intricacies of Hawai‘i, one can emphasize the Hawaiian mastery of materials. Some of the most significant structures in Hawai‘i were built of pōhaku (stone). Stone is the essence of great temples in Hawai‘i.

Wood, such as koa, or wiliwili (*Erythrina sandwicensis*), was useable for surfboards, structure posts, and beams. The thatch and pili grass shelters of single

program function spaces were mostly temporary structures of common people; however, they still expressed an understanding of fauna. Hawaiians used pili grass because during the hot, dry months, the grass would allow air to flow through the space and heat to escape. During the wet season, the grass absorbs the moisture and thickens to create a vapor barrier.

3.2.3.5 CRITIQUE

The office of Company C is thought provoking and indicative of their design strategies. There is a clear understanding of the Hawaiian architectural environment. The laborious expressions of stone and wood work are apparent. Company C memorialize the long lasting monarchy through expressions in the hierarchical structural system. Roof height is emphasized through perspective by altering roof pitch and extended ridge beams to signify a significant space. The firm executes this representation of hierarchical structures very well in all their contemporary architectural designs.

3.2.4 PBR

3.2.4.1 GOALS

As a landscape architecture firm, PBR places a focus on sustainability. With the "Local e Solutions" program, the firm aims to bring sustainable planning solutions and sustainable landscape to the islands of Hawai‘i. Working in Hawai‘i, PBR realizes the importance of highlighting site significance. Hawai‘i has a unique understanding and appreciation of place. More specifically, places in the natural environment. The ecosystem and natural resources have always provided for the people, and also carry with them the local history and culture. One of the goals of PBR is to provide culturally responsive planning and design solutions by incorporating appropriate sustainable practices where possible and restoring the native natural landscape.

One way PBR gives back is by volunteering their time in community projects. Green Apple Day is one such day where PBR gives back to a school project. It is a chance to teach the community about environmental sustainability and design. The last

project was at Hokule elementary school in Kaimuki where PBR helped to build a rain garden.

3.2.4.2 PHILOSOPHY

PBR strives to reduce project impacts on the environment by incorporating the latest global sustainability knowledge into their projects. PBR uses the Leadership in Energy Environmental Design (LEED) as design criteria, and Sustainable Sites as a guideline for design. These are the latest national standards for operations.

PBR takes community needs into consideration by providing short-term and long-term economic sustainability options into the project. They also try to incorporate the cultural and social context of a place.

3.2.4.3 PROCESS

Through studying the site history, (which includes the ahupua‘a, people, stories, and cultural practitioners), designers at PBR are able to gain an understanding of the place. Knowing what the prior use of the site was helps illuminate existing problems and potential solutions. Natural elements such as topography, soils, vegetation, and climate provide the resources for these types of questions. Analyzing the surrounding uses also helps to inform the design.

During the planning stage, research is done through extensive site visits in order to grasp what is there now. A team of specialists (ie: horticulturists, plant specialists, engineers, architects, biologists, hydrologists, archeologists) come together to develop a strategy for design.

In the micro design stage, the collective knowledge of the team is utilized to find creative solutions. Construction documents are then created specifying plant materials that aid in bringing back endangered species. PBR has a specific bullet proof plant list that they often try to work into their projects. Naupaka (*Scaevola coriacea*), Pohinahina (*Heliotropium anomalum*), Rainbow Shower, and Lauae Fern (*Phymatosorus grossus*) are just some of those plants. The final plant list is determined by site conditions and the availability of the plants in the nursery.

Some of the keys to think about when designing a landscape for public uses are safety and maintenance. When designing a place, it is important to think about space use for all times of the day and night. Dark spaces potentially allows for shady activity to occur. This should be avoided in public spaces. Maintenance of the plants, and the labor required to keep the area looking nice are important factors too. Water requirements, Sun, leaves, trimming, and the effects roots have on under the pavement are all real factors in a project.

Design decisions relating to plants include "Massing and Layering". This requires an understanding of how different colors and textures come together to create structural diversity. All decisions should aim to tie this concept to the architecture and use the landscape as an expression of space.

3.2.4.4 CRITIQUE

PBR is one of the largest landscape architectural firms in Hawai'i. Environmental sensitivity is a driving component for their projects which showcases sustainable design strategies and concepts in their work. Their values are sensitive to environmental issues and reflected in their cultural integration in built projects. The role of the landscape architect is to work in conjunction with the civil engineer to incorporate sustainable design strategies from the conceptual design stage through final construction.

3.2.5 THE NATURE CONSERVANCY

3.1.5.1 GOALS + PHILOSOPHY

The Nature Conservancy (TNC) is an organization created to sustain land and water resources that support life.[119] According to Sam 'Ohu Gon, senior scientist and cultural advisor at TNC, their goal is to keep places intact. This means to maintaining Hawai'i's ecosystem so that future generations can enjoy the same legacy we have. Hawaiians had an inherent understanding of the importance of land management and its

[119] "The Nature Conservancy", accessed Jan 7, 2014, http://www.nature.org/

relation to ocean management. The He‘eia ahupua‘a is a good example where such land management practices are showcased. The constructed lo‘i terraces in the midlands filter the rain water caught in the upland forests. The silt in water is caught in the ponds before it gets to the loko i‘a (fish pond). The fish pond is the last filter before erosion is released into the ocean’s coral reefs.

Through creating a living landscape where the people of Hawai‘i can experience nature thriving, we can share what special resources we have with the rest of the world. In the Hawaiian world view, all natural elements interact. Pali hāinu kai (a wet sea-cliff) is understood as offering water to the ocean to drink. This poetic understanding of language expresses the interconnected relationship of natural features. Thus, Hawaiian culture and Hawaiian ecology are inseparable.

3.2.5.2 PROCESS

In order to capture a sense of place, one must first gain an understanding of its history, original context, purpose, and uses. Stories, literature, and kūpuna are great sources of knowledge. ‘Ohu uses his deep understanding of biology to also understand the original climate, vegetation, and traditional natural landscape to imagine what the site might have looked like throughout time.

3.2.5.3 CRITIQUE

The Hawaiian world view and understanding of intimate relationships fed a harmonious symbiosis with the natural elements. The need for survival and pleasing the akua led Hawaiians to see the intricate necessities of nature and a respect for the power of natural phenomenon. Connecting the daily user to the environment would enable them to detect the changes in the season. This understanding and connection with nature gives value to the Hawaiian cultural renaissance of the 1970s. We must express this Hawaiian way of thinking in all parts of modern life. In turn, we protect Hawaiian values and allow them to be shared with the world through architectural design.

3.2.6 HUI KU MAOLI OLA PLANT NURSERY

3.2.6.1 GOALS

Hui Ku Maoli Ola, LLC, is a native plant nursery which focuses on preserving and perpetuating Hawai'i's natural and cultural history. Rick Barboza, the general partner, believes in, "reconnecting the disconnect of culture and habitat through landscape." By developing a public appreciation for Hawai'i's unique natural environment, the environment will educate the public about the cultural history. The team at Hui Ku Maoli Ola works together to grow native plants needed to rejuvenate native habitats. Projects range from entire valley restoration to home gardens. The use of natural materials is their medium to teach the public about Hawaiian culture. Increasing the knowledge of the potential use and function of plants found in your yard can increase the understanding of Hawaiian Culture.

Development and preservation have an opposing relationship. Hawai'i's unique landscape is impacted by agriculture and development. By bridging the gap in development and habitat loss, the team at Hui Ku Maoli Ola feels that landscapes provide an aid to surrounding habitats. Through water sensitive designs like xeriscapes and rain gardens, Hawai'i can showcase beautiful plants and landscapes without extensive irrigation. Habitat restoration, eco-scapes and invasive species eradication all provide footholds for native plants and animals to thrive. Over time, these footholds can slowly expand to create larger pockets of native habitation. Controlling erosion through hydro seeding and geotextile best management practices are other ways to manage our land and sea resources.

3.2.6.2 PHILOSOPHY

To highlight the strength of native species, Rick has made it a personal goal to plant a 'ōhia lehua (*Metrosideros polymorpha gaud*) at every house. The 'ōhia tree provides not only cultural benefits, but also ecological. Rick talks about a story of the 'ōhia being the first to grow out after a lava flow. The plant symbolizes the strength of native species and the recurrence of cyclical processes. Life can thrive amidst the destructive flow of lava, which is needed for the creation of land. It is believed that

when you pick the lehua blossom, rain will follow. There are many rain and wind names associated with the lehua (ie: kani-lehua, kinai-lehua, kini maka lehua, kiu wai lehua, līlī lehua, mouniani lehua, moe lehua, lū lehua, moa‘e lehua.)[120]

3.2.6.3 PROCESS

To understand a place, one first needs to do research that goes back 1000 years ago. One must also have a working understanding of the place until now. Books, place names, stories and people’s names associated with the place often give unique descriptions about a place that can aid in site interpretation.

The next step Rick does is to physically go to the site to see what’s there. Rick’s zoology and native Hawaiian biota background helps him understand Hawai‘i’s natural history. By locating certain plants, Rick uncovers information about the habitat and what the landscape many include both now and in the past. Different plants grow in different ecological zones; thus, identifying one of these plants gives physical references to where these zones start and end. Using plants native to a specific area allows for higher success rates for outplanting. Different species of the same plant (naio) sometimes co-evolve according to their micro climate. Using the seeds that have adapted to this surrounding habitat will increase the chances of success and reproduction.

The final step is to create a “footprint.” A footprint can aid in connecting adjacent areas, land features, soil types, precipitation, and plant palettes. Once the footprint is established, it will have a greater chance of flourishing a native plant community.

3.2.6.4 CRITIQUE

Rick Barbosa has a down to earth cultural approach and maintains a strong dedication to his beliefs. He sees the ecological and social benefits of culturally integrated designs. Using the physical medium of plants, he and his team are able to educate the public about Hawaiian culture from a natural history perspective. Using

[120] Refer to Appendix A2: vocabulary table: Mary Pukui, and Samuel Elbert, *Hawaiian Dictionary* (Honolulu: University of Hawai‘i Press, 2008)

Hawaiian language and traditional ecological knowledge the team of Hui Ku Maoli Ola is able to prescribe the appropriate plant palette and address environmental issues at multiple scales. Using traditional planting strategies, the projects are able to minimize water requirements.

3.3 LESSONS LEARNED FROM CONTEMPORARY INTERVIEWS

Looking back at the industry leaders of cultural integration in architecture and landscape design, I have developed a comprehensive list of things to consider upon design. Adding together the lessons learned from traditional analysis with the contemporary process will aid in developing a methodology for appropriate site sensitive - culturally driven responsive architecture that ensures cultural values. Form and functional aspects learned from Hawaiian culture can add value to the design. The assimilated process from the interviews resulted in the following conceptual short list:

1 Front loaded process[121] + Hawaiian world view[122]

2 Kaona [123]

3 Site informs form[124], Hierarchical structures[125]

4 Magnify the unique + Highlight the success[126]

5 Architectural environment [127] + Environmental sensitivity reflects Cultural attributes[128]

6 Landscaped emotional experience[129]

7 Increase Awareness[130], Choreographing the flow[131]

8 Add value to cultural renaissance[132] ; "Footprint" to encourage growth[133]

[121] Principle B, interview by author, Company B, Feb. 20, 2014
[122] 'Ohu Samuel Gon, interview by author, The Nature Conservancy Headquarters, Mar.13, 2014
[123] Principle B
[124] Chairman A, interview by author, Company A, Feb. 18, 2014
[125] Principle C, interview by author, Starbucks Ward Ave. Feb. 26, 2014
[126] Principle C
[127] Principle C
[128] Ray Higa, interview by author, PBR, Mar. 10, 2014
[129] Principle C
[130] 'Ohu Samuel Gon
[131] Chairman A
[132] 'Ohu Samuel Gon

> *"A 'footprint' in sense that this methodology of design can be used at other locations, reaching out farther across the globe to change the design process of the greater architectural community to create more responsive site intimate designs.* [134]"

In this creation of a design methodology that integrates traditional knowledge and contemporary based design philosophy, similarities with current local industry leaders should be apparent. The next step in the research stage is to understand global sustainability trends of environmental and social design.

[133] Rick Barbosa, interviewed by author, Hui Ku Maoli Ola Nursery., Mar. 17, 2014
[134] Rick Barbosa, interview by author, Hui Ku Maoli Ola Nursery. Mar. 17, 2014

CHAPTER 4:
CONTEMPORARY EVIDENCE BASED SUSTAINABLE DESIGN: A CASE STUDY OF THE LIVING BUILDING CHALLENGE AND APPLIED SCIENCES

4.0 INTRO + PHILOSOPHY

The idea of the Living Building challenge was to create a codified standard for performance based buildings. The philosophy of Jason McLennan, author of the Living Building Challenge (LBC), focuses on the question; "What does good design look like and what are the societal effects of good design?" His mission is to use technology to elevate us on equal ground with nature as part of the living cycle as opposed to elevating us above nature as dominant beings.[135]

Humanity on a global scale is facing imminent ecological collapse.[136] Currently, architecture is one of the top contributors to environment degradation; therefore, as architects, we have a great opportunity for restorative change.[137] McLennan believes in order for architects and designers to take part in ecological restoration, knowledge of design and climate need to run concurrent in the education process.[138]

The Living Building Challenge Certification is no easy task. Out of 100 registered projects, only four are fully certified.[139] The challenge raises the expectations of society. It inspires both innovation and creativity.[140] Every single act of design is meant to make the world a better place.[141] The role of the designer is to shape the future

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[135] Jason McLennan. "A Living Future" (presentation, University of Hawai'i, Mānoa 2013)
[136] GreenBiz. Last modified July 17, 2013, http://www.greenbiz.com/blog/2013/07/17/verge-speaker-spotlight-jason-mclennan-author-living-building-challenge
[137] "The Challenge: The Future" accessed May 1, 2014, http://filmthropic.com/
[138] GreenBiz. Last modified July 17, 2013, http://www.greenbiz.com/blog/2013/07/17/verge-speaker-spotlight-jason-mclennan-author-living-building-feedburner&utm_medium=feed&utm_campaign=Feed%3A+YaleEnvironment360+(Yale+Environment+360
[138] GreenBiz. Last modified July 17, 2013, http://www.greenbiz.com/blog/2013/07/17/verge-speaker-spotlight-jason-mclennan-author-living-building-challenge
[138] Living Building Challenge 2.1.(Handbook, 2011), 5.
[139] Environment 360 Digest, accessed Feb. 8, 2014 http://e360.yale.edu/digest/living_building_challenge__aims_to_revolutionize_green_architecture/3533/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+YaleEnvironment360+(Yale+Environment+360
[140] GreenBiz. Last modified July 17, 2013 http://www.greenbiz.com/blog/2013/07/17/verge-speaker-spotlight-jason-mclennan-author-living-building-challenge
[141] Living Building Challenge 2.1.(Handbook, 2011), 5.

of their communities. Their impacts will either heal or degrade the environment and the values that are essential for healthy human communities.[142]

4.1 POWER, EFFICIENCY AND INFLUENCE OF NATURE

> "Imagine a building designed and constructed to function as elegantly and efficiently as a flower: a building informed by its bioregion's characteristics, and that generates all of its own energy with renewable resources, captures and treats all of its water, and operates efficiently and for maximum beauty."[143]

The Living Building Challenge takes inspiration from nature. Bio mimicry is one of many lessons learned from nature. Nature develops according to its habitat carrying capacity. The energy afforded is budgeted to how much can be captured and obtained. Design decisions will become appropriate for the project and the bioregion. To resulting in responsive architecture that creates greater biodiversity, increased soil health, outlets for beauty and personal expression and a deeper understanding of climate, culture and place.[144] From the basic unit (petal) of the flower, the framework of the Living Building Challenge is broken down into seven individual petals, that each direct design decisions.

4.2 SEVEN PERFORMANCE AREAS ("PETALS")

Consisting of seven petals or performance areas, the Living Building Challenge requires designers to use qualitative and quantitative aspects of thought. The left brain petals include site, water, and energy, while the right brain petals include health, material, equity, and beauty of the design.

The performance areas are divided into sub-categories which include twenty imperatives. These imperatives are classified by project typology. Each typology has its own list of mandatory imperatives to be met. The implementation of the challenge

[142] McLennan. "A Living Future." (Presentation, 2013.)
[143] Living Building Challenge 2.1.(Handbook, 2011), 3.
[144] Living Building Challenge 2.1. (Handbook, 2011), 5.

assumes that industry best practices are already met. This requires, "leading-edge technical knowledge, an integrated design approach, and design and construction teams well versed in advanced practices related to 'green building'."[145] This case study aims to provide a broad level of understanding for each goal of the seven petals and introduces imperatives that focus on bettering the management and my design of the cultural heritage and landscape center at Kūkaniloko in Wahiawa, on the island of O'ahu. Future studies of the LBC imperatives, specific to the individual project will need to be completed for LBC recognition.

4.2.1 SITE

Versatility of architectural design begins with the project vision. The identification of the project program begs the question of where to build. The projects relation to the site starts with economic significance. The Living Building Challenge then asks the questions: how to protect/ restore the site; how does the project support pedestrian needs; what is the project's relationship with local and regional agriculture? The LBC instills the notion of logic and ethics in every design decision.

The visual perception of the landscape has a psychological effect on human emotion.[146] To create a positive relationship, the LBC suggests that the on-site landscaping reflect the density and biodiversity of the indigenous ecosystem in an effort to limit the perception of development and growth. How we manage the development of sensitive areas like wetlands, primary dunes, old-growth forests, native prairies and prime farmland is a prime focus of the LBC. Kūkaniloko, as prime farmland, is an ideal candidate for this application.

The cohesive island planning approach is designed to create urban agriculture and compacted smart growth communities that support the protection and management of outlying rural areas. The LBC supports a Habitat Exchange Program. The idea is to decentralize nature. Here, one hectare of development that takes place in an urban core district would set aside a minimum of 0.4 hectare offset habitat away from the project

[145] Living Building Challenge 2.1. (Handbook, 2011), 10.
[146] Rachel Kaplan, Steven Kaplan and Robert Ryan. *With People in Mind, Design and Management of Everyday Nature.* Island Press. (Washington: Island Press,1998), 12.

for protection in perpetuity. Development projects in places like Kakaʻako would be required to preserve the natural habitat elsewhere on the island to maintain this ecological ratio.

4.2.2 WATER

The LBC touches on greater issues of "good" design. The capitalist attitude of expressive dominance, wealth and power over nature should be re-evaluated. We need to recognize that water is a precious resource. The intent of the LBC water petal is to realign the use of water and redefine "waste" in the built environment.[147] In order to protect the ecological flow of the water cycle, water sensitive designs should aim to maximize the use of water harvested on site through a natural close loop system.

A net zero water catchment and purification system challenges existing technology to avoid the use of any purification chemical in order to allow for pure water to be recycled back into the natural hydrology of the land. Protection of the ecological water flow has an outward reaching impact on the community from the site. Storm water management systems can be integrated with water demands and handled onsite.. Time-scaled surface flow allows for groundwater recharge to be used by local agriculture and other adjacent property needs. LBC intends that the water demands for the project are based on carrying capacity of the site. Complying with the water petal ensures protection of environmental and societal health.

4.2.3 ENERGY

The global trend of architecture to operate solely on new forms of safe, reliable, and pollution free renewable energy marks the new "ism" of architecture -- "sustainabolism" or "environmentalism". The environmental movement aims to redefine the conventional meaning of modern architecture by increasing the application of physics and the biological processes in the natural landscape. The goal is to highlight the landscape as an instrumental system of resources and to support the built environment

[147] Living Building Challenge 2.1. (Handbook 2011), 18.

with renewable forms of energy.[148] The LBC prioritizes the optimization of energy technologies in order to provide net zero energy structures as the standard for design.

5.2.4 HEALTH

The LBC aims to maximize physical and psychological health through major design conditions.[149] The LBC suggests that comfort and environmental impacts are directly related. A decrease in comfort is correspondent to increased negative environmental impacts.

Creating a civilized environment includes addressing issues like thermal control. Often times, in Hawai‘i, operable windows are a must to control fresh air and natural light. Providing healthy air requires more than a window study. Program configurations are analyzed and then paired with ventilation and exhaust systems which are monitored for temperature, humidity and carbon dioxide levels.

Visual comfort is also addressed under the category of health. The biophylic hypothesis describes the intrinsic bond between humans and other living systems such as plants and animals. The visual and physical connection to nature nurtures the innate human attraction to the natural environment. The LBC requires a visual line of site to six biophilic elements per half-acre of development. The six elements include: environmental features; natural shapes and forms; natural patterns and processes; light and space; place-based relationships; and evolved human-nature relationships.

Eco-psychology is the study of the relationship between human health and the natural environment. Theodore Roszak, an eco-psychologist and author of "The Voice of the Earth", states:

> "A greater balance in our relationship with nature will naturally accompany healthier relationships between the genders and greater individual psychological health."[150]

[148] Pierre Belanger, "Landscape as Infrastructure," (*Landscape Journal*, 2009), 79 – 95.
[149] Living Building Challenge 2.1. (Handbook, 2011), 23.
[150] Theodore Roszak. *The Voice of the Earth an Exploration of Eco psychology*. (Interview with Jeffery Mishlove.1992) Accessed May 1, 2014. http://www.youtube.com/watch?v=83VHiA2HhkM.

The biophilic hypothesis and Eco-psychology suggest that human health is directly related to the balance and connection between the way people think and the way nature works. Enabling health through design requires fulfilling the needs of people and the natural world, as one impacts the other.

4.2.5 MATERIALS

If taking care of people is tied to taking care of the Earth, than the way we obtain construction materials should be done so in a way that is appropriate and responsible as well. The LBC supports transparent and socially equitable resource extraction industries and regional sourcing.[151]

To design for a world with limited resources, we must include design principles of conservation and reuse. Developing a material conservation management plan which extends the life of the project is a method proposed by the LBC. This includes: designing the appropriate durability specifications; optimizing material consumption and collection during both construction and operation; and planning for adaptable reuse during deconstruction.[152] This requires a holistic view of material procurement, the effectiveness of its use, and how design use will impact future uses.

4.2.6 EQUITY

With a mission to create a restorative future through design, the LBC aims to foster a sense of community through connective destinations and districts that protects and restores the natural environment, while providing equal access for all people. The LBC ideology transcends multiple scales. Equity can be portrayed in street furniture, land tenure, and community governance. Designing to this standard requires the promotion of human and environmental needs. Culture defines these needs through a system of behaviors that expresses the relationship a community has with the universe. The system is transmitted through a social context that is dependent on time and place;

[151] Living Building Challenge 2.1. (Handbook, 2011), 30-31.
[152] Living Building Challenge 2.1. (Handbook, 2011), 33.

thus, is has the potential to change. Designing to the pertinent culture enables community identity to be created and recreated.

When informed by culture, the design elements will be more effective and interactions between people will be enhanced. Soft and hardscape, proportions viewed by the community will enliven livable places. This is fair and socially just design, thus, serves the needs of all ages and socioeconomic classes by providing more opportunities and choices for the community. Democratic design can include values of living lean, affordable housing, shared communal spaces and more available resources. These smart growth strategies secure community access rights to fresh air, sunlight, beaches, waterways, and wilderness areas. This multi-functional approach protects the health of people and the environment. Over all, the intent of the equity petal is to provide the opportunity for all people to have fuller and richer lives.

4.2.7 BEAUTY

As designers the idea of beauty is perceived to be a subjective precursor to preserving, conserving, and serving the greater good.[153] Architects are obligated to strive for a celebrated design that creates a transformative change. In this way, the experience of the end user is the measure of beautiful design. Design inspiration and education are meant to expand the perspective of what is important to the observer.

4.3 LESSONS LEARNED FROM LIVING BUILDING CHALLENGE

The mission of LBC touches on human passion and emotion through the vision of hope. This provides a better world via human ethics expressed through design and backed by logical application of various evidence based sciences. The goal is to create a regenerative future through design that enables physical and psychological health of humans and the environment. Jason McLennan imagines the new era of architecture to

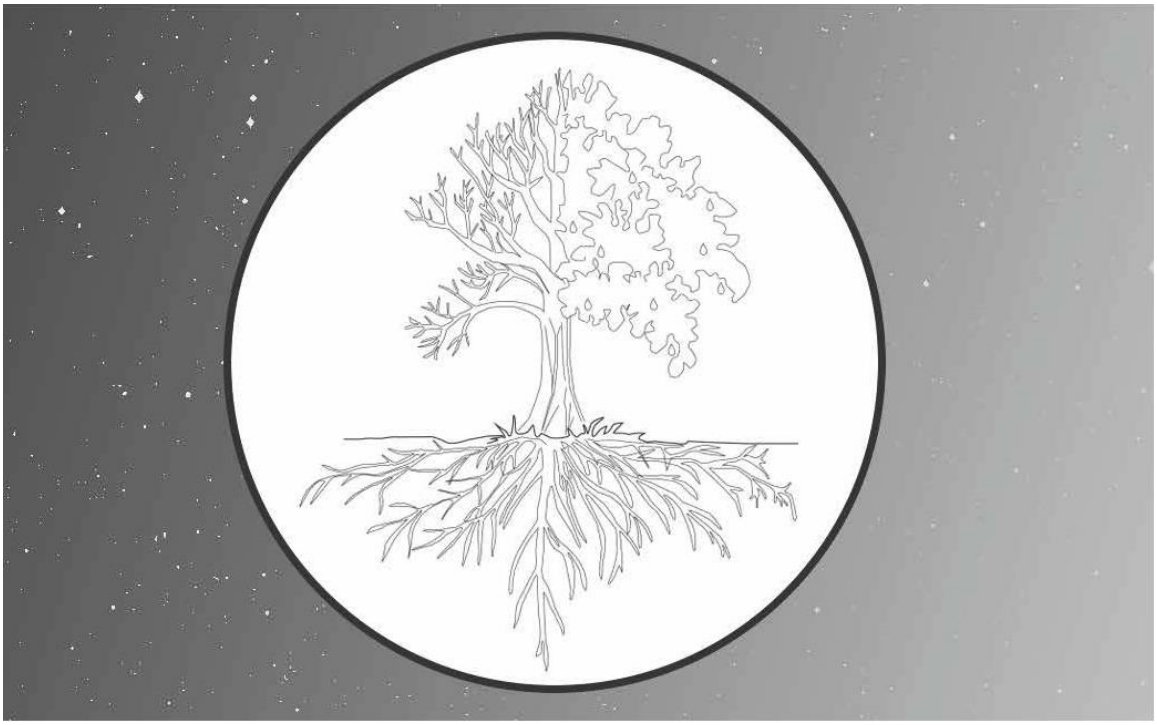
[153] Living Building Challenge 2.1.(Handbook, 2011), 40.

be like, "lighthouses of where civilization needs to head. And hopefully someday this is how we build everything."[154]

The grand ideas of the LBC can be enhanced and supported by modern neuroscience research. Through understanding the human brain, our decision making process and psychological perception of space will inform design in a way that is beneficial to the health of society and the environment.[155] In the effort to make "good" design, one need to weave together ways in which nature works with the way people think. This holistic design approach includes everything from ecological cycles, inherent human connections to nature and health, the development of culture and community identity, and the means to inspire people.

[154] Filmthropic. "The Challenge: The Future (teaser3 WIP)". accessed 4/21/14http://vimeo.com/41388101
[155] David Icke, "The Reptilian Brain", last modified May 2000. http://www.bibliotecapleyades.net/sumer_anunnaki/reptiles/reptiles14.htm

CHAPTER 5:
THE "MAMO PROCESS" OUTLINE



5.0 "MAMO PROCESS"

E No'ono'o Hawai'i translates to, "think Hawaiian". Poetically, the phrase can be translated to mean, "honor the essentials of life created by God to design an experience that preserves our future." This simple phrase honors the Hawaiian world view. It is a synthesis of natural truths woven with the Hawaiian values pono and lōkahi to inform a design protocol. Designing a significant piece of land such as Kūkaniloko, one must consider many aspects of the life giving process. In comparison to western science, the indigenous Hawaiian way of understanding is a poetic blend of knowledge and thought. Many things come together to create a solid, sustainable foundation. The "Mamo Process" encourages a site intimate ecologically integrated design that nurtures the relationship between man and land.

Figure 5: Black Honey Creeper[156]; Safflower[157]; Sergeant Fish[158]

First we start with the word hoa. The word hoa has multiple meanings in ʻŌlelo Makuahine: 1. (noun) friend or companion; 2. (verb) to tie or bind; 3. (verb) to strike with a club; and 4. (noun) similar in meaning to the mamo. The word mamo also has multiple meanings: 1. (noun) black Hawaiian honey creeper (*Drepanis pacifica*) (its yellow feathers are used in the finest feather work in Hawaiʻi); 2. (noun) Safflower or false saffron (*Carthamus tinctorius*) (a yellow flowering plant, also found in Asia); 3. (noun) a sergeant fish (*Abudefduf abdominalis*) (yellow in color); 4. (noun) descendant, posterity or child.[159]

The definition of hoa first describes a relationship of a close friend (hoa aloha) -- bound together like the thatching of a canoe. The bond is of such strength that it is not to be forgotten. Its mark has been made, like the force from a club. The relationship describes the familial connection that includes the sea, the Earth, and the sky.

[156] "Mamo bird" accessed Feb. 23, 2015. http://hawaii.gov/dlnr/consrvhi/forestbirds/mamo1.html.
[157] "Mamo flower" accessed Feb. 23, 2015. http://khartasia-crcc.mnhn.fr/en/content_en/carthamus-tinctorius-l.
[158] Stender, Keoki "Mamo fish" accessed Feb. 23, 2015. http://www.marinelifephotography.com/fishes/damselfishes/abudefduf-abdominalis-j.jpg
[159] Refer to Appendix A2: vocabulary table: Mary Pukui, and Samuel Elbert, *Hawaiian Dictionary* (Honolulu: University of Hawaiʻi Press, 2008)

5.1 MAMO PROCESS DESCRIPTION

The Mamo Process is a methodology which uses Hawaiian culture and site understanding to enable a meaningful connection between man and nature through architecture. This creates a meaningful interaction between the place, culture, and history that gives back to the place in a way that respects its' past and transmits it to the future; with authentic cultural representation. By focusing on different realms, including the earth below and the heavens above, the cultural relationship between man and place is fully realized.

As the Living Building Challenge is broken down into petals of a flower, the Mamo process is likened to that of the entire tree. This Mamo tree can be taken around the world for any new project. It will regenerate the physical and psychological health of humans and the environment through design.

Starting with the roots, one establishes the vision of the project through inherent values and passions. During the Logic Phase, intrinsic values are funneled through design parameters which focus the design decisions on the purpose of the project. The Logic Phase informs what the significance of the project is. The project then takes many different turns as the designer determines the degree of impact the building will make on society and the environment during the Ethics Phase. This third phase is set within the Living Building Challenge matrix. The final Translation Phase of the design is where we see a change in paradigm that uses a new methodology and creates a new normality of design. The fruit of the tree are the gifts to society and ecology. Figure 5 is a visual representation of the Mamo Process.

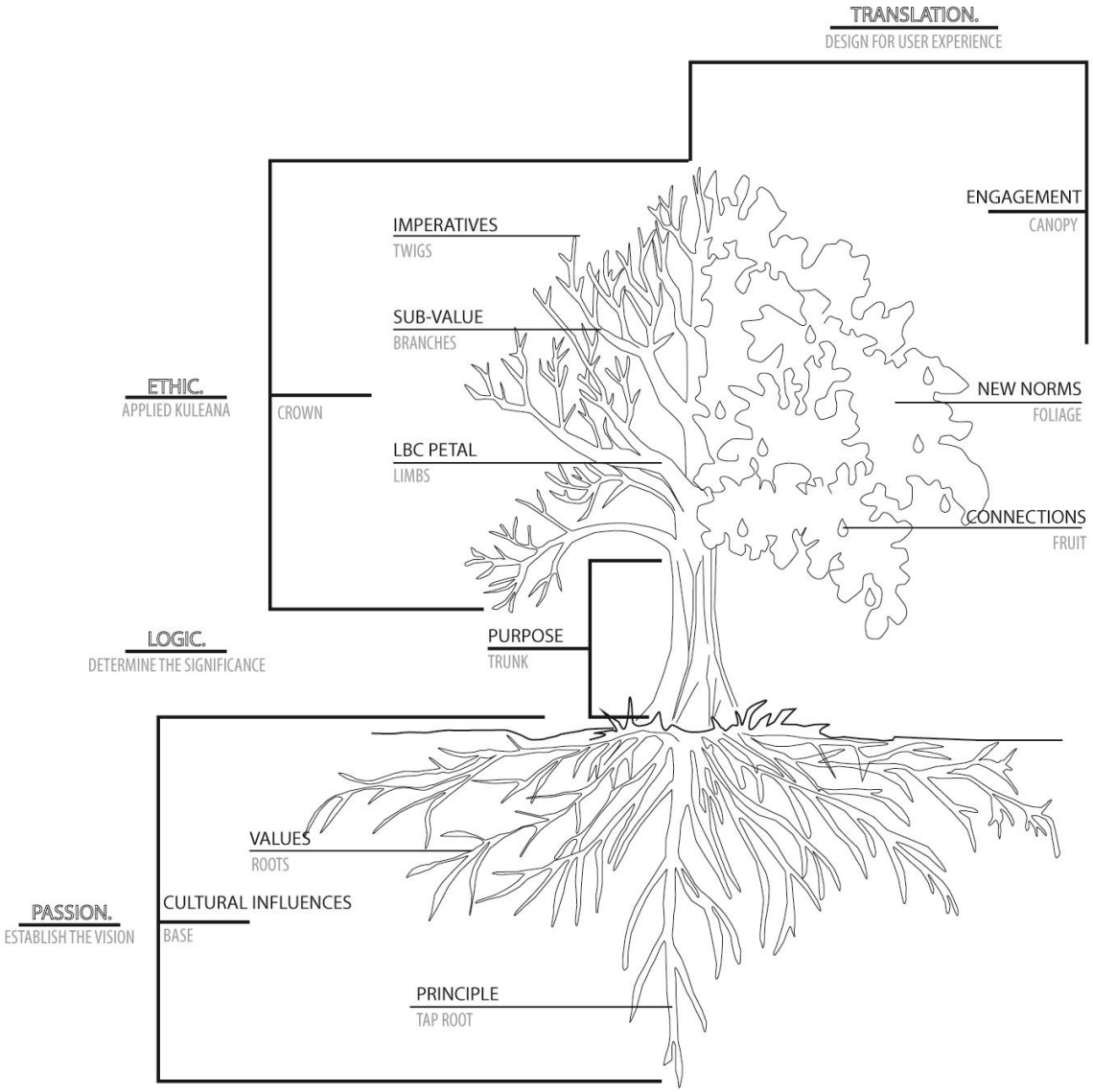


Figure 6: Author created Mamo Tree Process

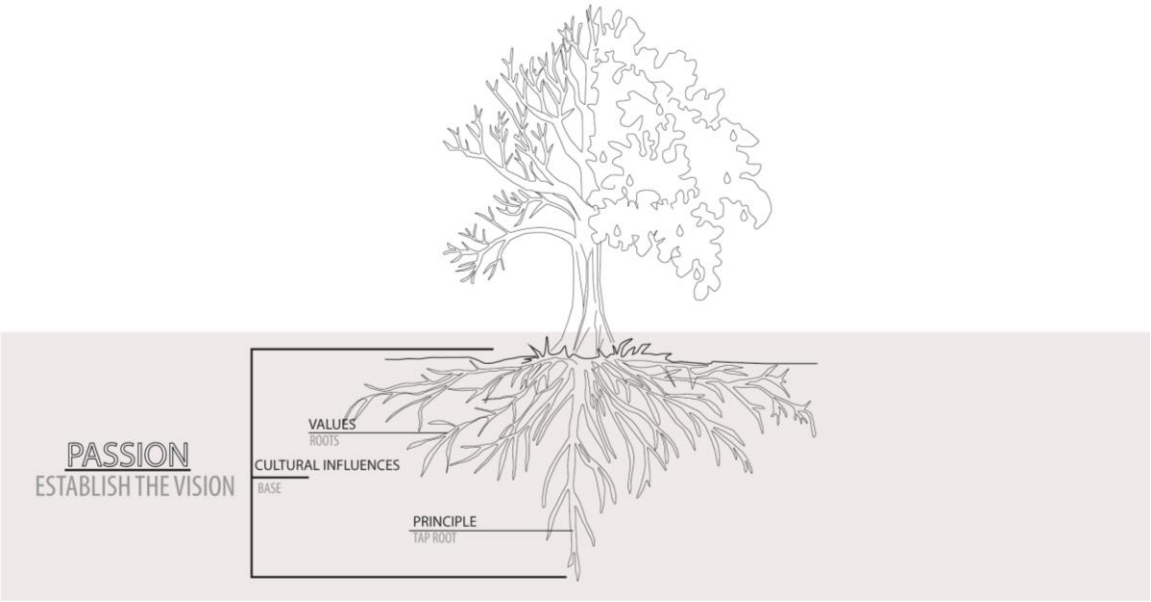


Figure 7: Passion Stage of Mamo Process

5.2 PASSION PHASE

5.2.1 ESTABLISH THE VISION

The process begins with establishing the vision of the project. The first phase of the process begins by honing in the excitement of the client and design team towards the principle experience that encourages an intimate connection between humans and the surrounding nature via the design. By establishing a base of cultural influences and incorporating trans-cultural values of pono (righteous) and lōkahi (balance), we can reach interconnectivity between sea, land, people, and sky. The end objective is to harmoniously tune the different realms of influence through the power of design.

Figure 8: Logic Phase

5.3 LOGIC PHASE

5.3.1 DETERMINING THE PURPOSE AND SIGNIFICANCE

Determining the significance of a site relies on client needs, supporting facts and site analysis. Information is based on time and place. Developing the purpose of the project requires generating an overlay of information which incorporate societal, economic, and environmental needs. The design form and function is driven by aspects of the site. Starting with the site first ensures that the uniqueness of each site is the driver for each design.

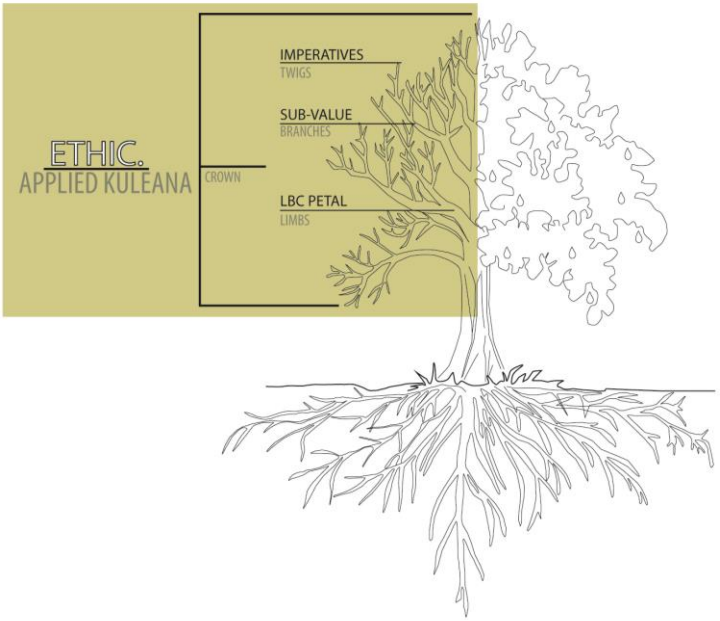


Figure 9: Ethics Phase

5.4 ETHICS PHASE

5.4.1 APPLIED KULEANA

Using the site to inform shape and function will allow for culturally appropriate design. To create a truly site inspired design requires the designer to assimilate how we think with the way nature works. The Living Building Challenge breaks this down into seven parts: site, water, energy, health, materials, equity, and beauty. To help designers apply their kuleana (responsibility), we aim to create a regenerative future through design that enables physical and psychological health of humans and the environment.

The kuleana of designers is not only on a physical / aesthetic level of creating, but also a psychological part of the brain. Architecture has the power to affect how we feel in a space. The designer uses their abilities to encourage psychological connections through manipulations of physical space. This manipulation of space can influence how the experiencer will translate the design through a connection to their surroundings.

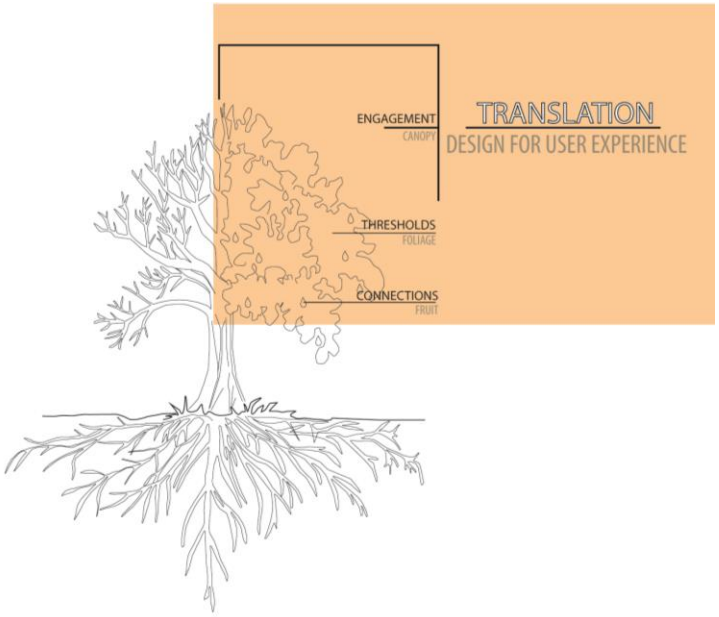


Figure 10: Translation Phase

5.5 TRANSLATION PHASE

It is the goal of the designer to choreograph an experience for the user. This experience can be classified in three stages: engagement, threshold and connection.

5.5.1 ENGAGEMENT

Engagement happens early on in the user experience. The designer provides the user with information that supports the design vision.

> "Information is central to our effectiveness, to our sense of esteem, to our interdependencies, to the basis for distinguishing ourselves from others; information is inescapable, essential and pervasive."[160]

How this information is arranged will influence a users' ability and want to understand and explore.

[160] Kaplan and Ryan. *With People in Mind, Design and Management of Everyday Nature.* 1998. 7

5.5.2 THRESHOLD

Passing through the threshold requires visual and spatial information to clearly share the important message to locals and tourists of all generations. This information exchange aims to accommodate the diverse backgrounds of the users so they can each appreciate the information gained, while instilling the codified appropriate behavior.

5.5.3 CONNECTION

The end goal is to encourage information exchange via a connection that inspires and educates. This information exchange is not one directional. The process of design is constantly evolving and the users share as much information with the designer as the designer shares with the user. This establishes the connection, and allows the story to be taken beyond the limits of the site.

When coming to a sacred place, people bring with them the mindset that they will be exposed to spiritual or mental rejuvenation. As mentioned before, this state altering quality is similar to the function of pu‘uhonua in Hawaiian culture. The second aspect of a sacred place is its bank of inspiration, where its influence can reach out beyond the limits of the site. This is similar to the function of a kipuka. This inward outward flow of inspiration is why a process of design that promotes a meaningful interaction between place, culture and history is required.

5.6 BENEFITS: THE FRUIT OF THE MAMO PROCESS TREE

The Mamo Process benefits are metaphorically seen as the fruit of the tree. The fruit is separated into three categories. The categories are the triple bottom line of culture: spiritual, physical and intellectual. This balances the needs of Akua, ‘Āina, and Kanaka. Within each area of the fruit are the different petals of the Living Building Challenge. Collectively, the benefits of the Mamo Process affect identity and health. Figure 11 is a visual representation of the holistic process; starting with the seed as it progresses through the tree and develops the fruit.

The fruit of the project should help strengthen the cultural identity of the place. This is accomplished by raising cultural awareness. The architecture and landscape design highlights the physical and spiritual connection to nature. Empowering a cultural kipuka and pu‘uhonua, increases the sense of cultural pride and inspiration of all who visit. The design helps establish a “footprint”[161] or seed bank on the basis of regeneration and the ability to tune into one’s surroundings.

The health of our people is enhanced through the sustainability of the ecology and mind. The environment can help in every aspect of your life. It opens one’s mind to see what’s important. Reconnecting with nature is good for your soul, as it reminds us that we are only here for a limited amount of time as servants to the hand of God.

5.7 WAYS TO MEASURE SUCCESS

These are questions to consider when assessing the effectiveness of the Mamo Process:

1. How does the user experience the cultural significance of the site because of the architectural design?

2. How does the design enable cultural values to be passed on to future generations?

3. How does the user experience foster not only an intimate building to site relationship, but also a site relationship to the world through the design?

4. What story does the building tell?

[161] Rick Barbosa. Interview Mar. 17, 2014

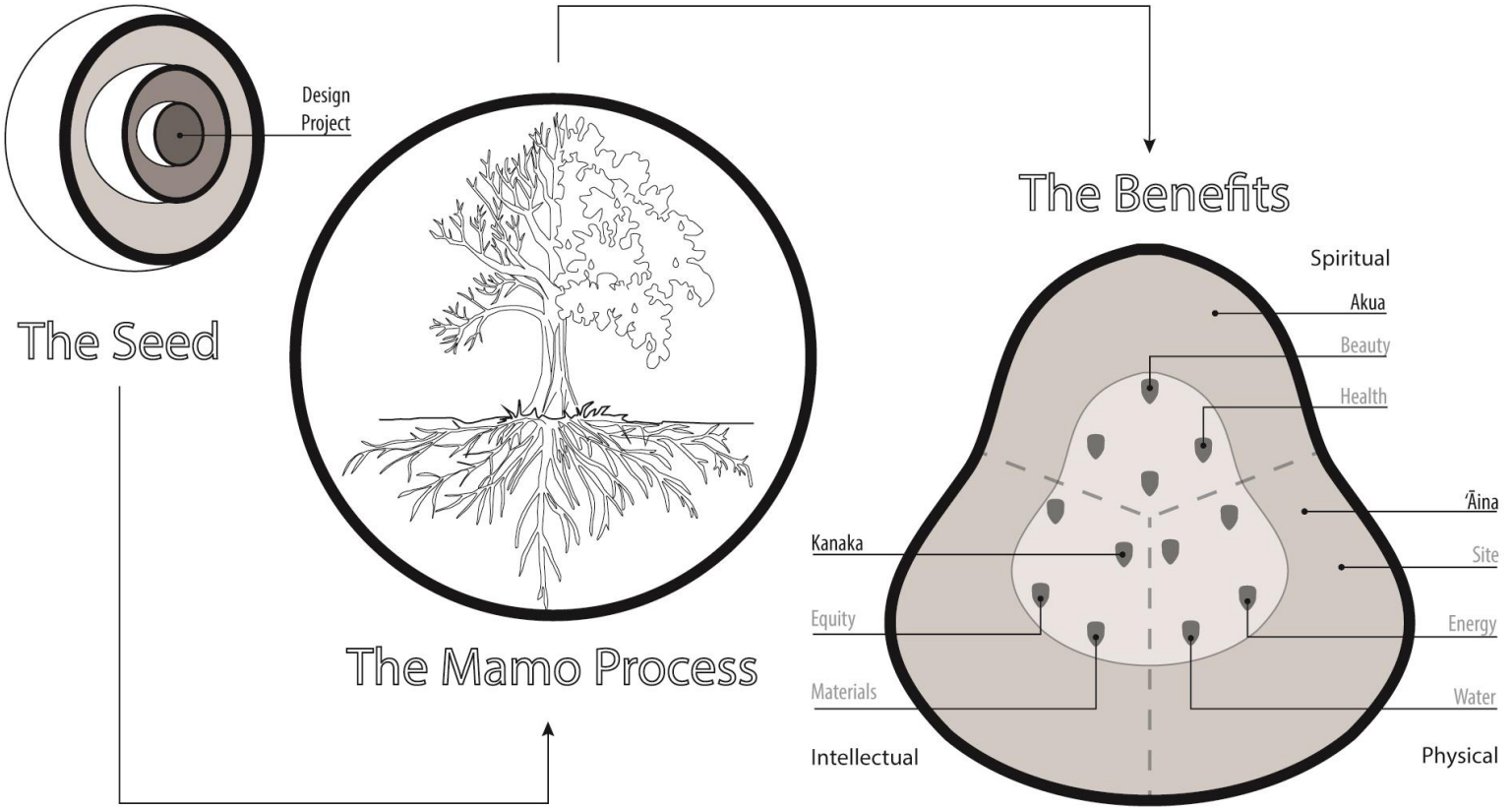


Figure 11: Benefits of the Mamo Process

CHAPTER 6:
IMPLEMENTATION OF THE MAMO PROCESS AT KŪKANILOKO

6.0 PASSION PHASE

6.0.1 ESTABLISH THE VISION

The vision for Kūkaniloko, wahi kapu, would first and foremost be to hoʻomana the site. The site has many transformations resulting in loss of culture. The vision is to protect, preserve and enhance the existing mana of the site. The site holds an inherent mana established through cultural value. Through mālama ʻāina, the mana can be enhanced and spread to all who visit the site. The mana requires a two way cycle of putting in and getting out. Visitors who come to the site on a daily basis come to recover from fatigue spiritually and mentally; however, something needs to be done to reciprocate this taking from the site. Correcting the ecological and cultural wrong doings that have been done to the stones and the soil will help hoʻopono the site as well as hoʻomana the place. Thus, this intervention will help balance the physical, spiritual and intellectual well-being of the site. Figure 12 shows how the existing level of mana can grow as we mālama the stones of Kūkaniloko. The mana will continue to inspire exponentially as educate others through the cultural center and other ancillary uses.

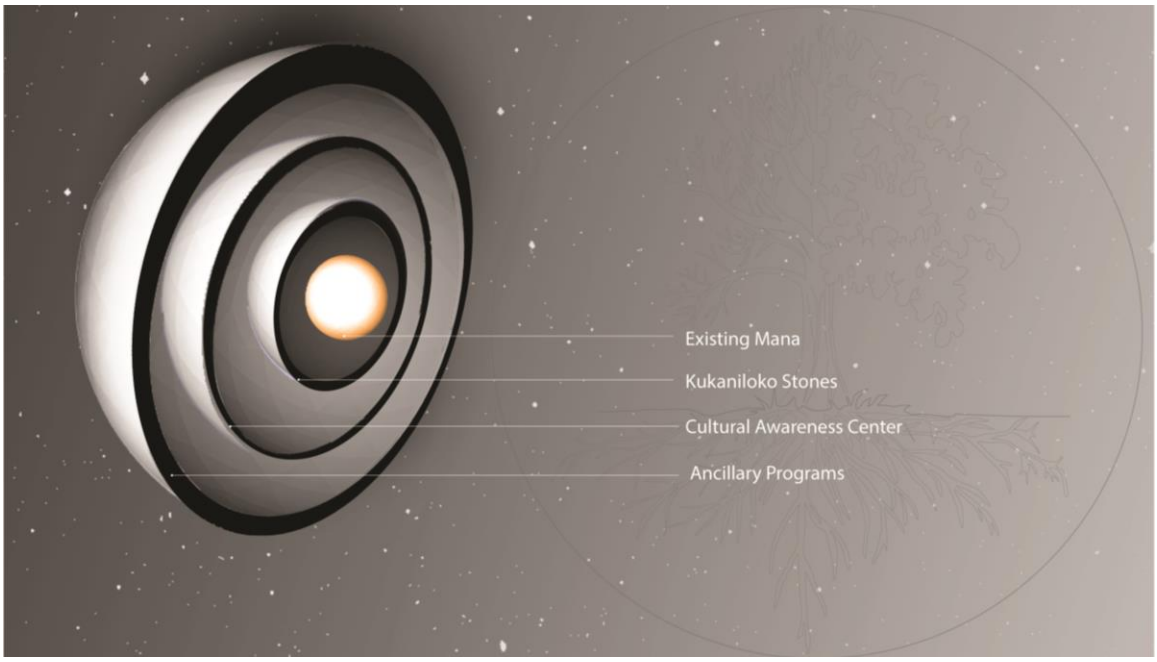


Figure 12: The Seed: Hoʻomana Kūkaniloko

Using architecture and landscape architecture to choreograph and encourage a liminal experience, visitors who come to the stones can receive a culturally appropriate experience. This experience would appropriately and accurately tell the story of Kūkaniloko. For means of the Mamo Process, Kūkaniloko cultural site becomes the trunk and determines the significance of the design, as seen in Figure 13.

Figure 13: Kūkaniloko is the trunk of the Mamo Tree Process

6.1 LOGIC PHASE

6.1.1 DETERMINING THE PURPOSE AND SIGNIFICANCE

The program and form of the cultural center is based upon a formal site analysis of traditional and contemporary ecological conditions and land uses. We can then focus the significance of the cultural wahi pana to fulfill the client's goal of creating a self-sustaining property. The 500 acre site will tell the story of Kūkaniloko and protect the stones culture. At the same time, we can explore appropriate agriculture and contribute to Hawai'is' food sovereignty efforts.

6.1.2 CLIENT OVERVIEW

The mandate of the Office of Hawaiian Affairs (OHA) is to raise a nation through stewardship that is strategic OHA's systemic priorities are grounded in the ties between lāhui and ʻāina: health, land and water, economic self-sufficiency, education, governance, and culture. Hawaiʻi's people (lāhui) and environmental resources (ʻāina) are linked as one.

6.1.3 CLIENT GOALS

1. Advance strategic priorities with place-based programs and generate income that diversifies investment portfolio.

2. Protect Kūkaniloko as the piko that helps further enliven the Hawaiian Nation by connecting past, present, and future.

A. Piko Poʻo (past): the crown or soft area of the head closest to the lani (heavens) and kupuna - (Kuleana: preserve and protect Native Hawaiian cultural sites);

B. Piko ʻEwe (present): the umbilical cord or physical connection to our mother (Kuleana: develop viable agricultural opportunities and initiatives/programs);

C. Piko Maʻi (future): tie to future generations - (Kuleana: contribute and support self-sufficiency and self-reliance for Native Hawaiians).

3. Develop cultural appropriate landscaping that adds to the sacredness of Kūkaniloko for Native Hawaiian cultural uses.

6.2 FORMAL SITE ANALYSIS

The cultural landscape of traditional sacred places are emphasized and described in moʻolelo about the natural features (winds, stones, mountains) and their associations with deities and people. The Hawaiian cultural landscape also included man-made features such as fields, houses, religious places, and burial locations. Figure 14 shows some of the historical context surrounding Kūkaniloko.

Figure 14: Historical Significance[162]

6.2.00 GENEALOGY

For many generations, no man was made chief over another. It wasn't until the birth of Kapawa in the 12th century at Kūkaniloko near Wahiawā on O'ahu that the first

[162] "Kahu image." Accessed Sept. 9, 2014, https://www.facebook.com/kai.markell/photos
"Kahu base image." Accessed Sept. 9, 2014, http://jasonmatias.com/wp-content/uploads/2013/11/Kukaniloko-Monk-2-1024x681.jpg
Herb, Kane. "Ruling Chiefs (CH11)" Accessed Sept. 9, 2014, http://herbkanehawaii.com/image-catalog/chiefs-alii/ruling-chiefs-ch11/
"Piko Stone" Accessed Sept. 9, 2014, http://1.bp.blogspot.com/zQxA9ldEtco/U6d3uHl3zyI/AAAAAAAADjg/AfrCf5BbkHw/s1600/053.JPG
"Ili'ahi" Accessed Sept. 9, 2014, :http://2.bp.blogspot.com/mgWWLclpm08/T1uLtjHiKXI/AAAAAAAAAGA/Wsy0uvkXLds/s1600/Sandalwood+(Iliahi).jpg
"North East Shore Trail". Accessed Sept. 9, 2014, http://cdn.c.photoshelter.com/img-get/I0000hc9u87qwnPg/s/600/600/North-East-Shore-Trail-Big-Island-Hawaii-copy.jpg
"Ulu Maika" Accessed Sept. 9, 2014, http://www.mauimagazine.net/images/cache/6746918d3973cdc6ba9783c429dece1a.jpeg
"Kauhale" Accessed Sept. 9, 2014, : http://st.depositphotos.com/1906091/1838/i/950/depositphotos_18389767-Kauhale--Traditional-Hawaiian-living-site.jpg

ruling chief was born.[163] Kapawa was the son of Nanākāoka and Kahihiokalani.[164] To be born at Kūkaniloko, one needed to be of chiefly lineage, an akua of the land, and an aliʻi kapu.[165]

Kūkaniloko was an area with many resident chiefs. It was the most famed of all the places in this cultural landscape of the Central Plateau. Kūkaniloko was a kapu and very hallowed place. This Hoʻolono pahu was a sacred spot, a consecrated spot. The birthing complex, the waihau heiau, was where the navel cords of the chiefs were cut.[166] Kūkaniloko is part of the moʻokūʻauhau (genealogy) of the chiefs. Moʻokūʻauhau is a Hawaiian understanding of place and time. The ones born at Kūkaniloko are believed to have had spiritual powers. According to John Papa I'I, Kūkaniloko was said to be a puʻuhonua (place of refuge).[167] In the early 1930s, Kūkaniloko was the only site allowed official protection against demolition.[168]

Heiau were planned out by a special architect kahuna, the kuhikuhipuʻuone. The aligning of a new heiau with a pre-existing heiau or sacred place was certainly possible. It is believed that other heiau and sacred places on Oʻahu are aligned with Kūkaniloko. Some cultural astronomers believe all heiau on Oʻahu are aligned with Kūkaniloko through the moon, Sun and stars. The setting sun of the summer solstice aligns Holoholokū with Kūkaniloko.

Holoholokū is another birthing site at Waialua on the island of Kauaʻi.[169] Together these birth places were specifically designated for the birth of high ranking children. The chiefs of Hawaiʻi and Maui were said to have sought greater prestige for their off-spring by marrying those who had strong ancestral ties with the exalted lineage. The births at Kūkaniloko and Holohokū helped maintain the purity of the genealogical ties. Such birthing events had far reaches beyond the islands of Oʻahu and Kauaʻi.

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[163] Sterling and Summers. *Sites of Oʻahu*. 1978, 90
[164] McAllister, 1933, 134
[165] Samuel Kamakau. "No Ke Ano Hoku."(*Ka Nupepa Kuokoa* July 26, 1865, English Translation by W.D Alexander Johnson and J. Mahelona, 1975). 72-73.
[166] Kamakau. "Ka Moolelo o na Kamehameha", February 1, 1869, 58.
[167] John Papa I'i, *Fragments of Hawaiian History*, (Honolulu: Bishop Museum Press, 1959): 138.
[168] Becket and Signer. *Pana Oʻahu Sacred Stones, Sacred Land*. 1999, 64.
[169] Kamakau, *Tales of Traditions of the People of Old: Nā Hāna a ka Poʻe Kahiko*. 1991, 38.

6.2.01 THE NAME: "KŪKANILOKO" AND ITS MEANING

Interpreting place names can be a very complicated issue due to many different interpretations and viewpoints. The meaning of names can differ between the proto-Polynesian language, peoples' perceptions, or kaona meanings. Gathering rare known meanings from old sources or knowledge passed down by kūpuna and analyzing the meanings is one way to understand the meanings of these names. Choosing to avoid this problem by not attempting to determine the meanings and simply accepting the names of places undermines what can be found about how these places were used and looked like in past times.

Three large districts (moku) are known to have made up the central plateau of Oʻahu in the mid-1800s: Waialua, Waiʻanae, and ʻEwa. Kūkaniloko was located in the Waialua moku in the ahupuaʻa of Wahiawā and the kula (flat land) of Halapale. If you first look at the meaning of the name Wahiawā, one will find multiple translations. The word can be broken into three parts. Wahi (place), a (belonging to), and wa (noise). In *Place Names of Hawaiʻi,* Pukui, Elbert, and Moʻokini, translate Wahiawā literally as a "place of noise."[170] The name Wahiawā could be a reflection on the recurring and distinctive natural noise of frequent thunderstorms, or the large crashing surf of the North Shore, or the drums that sounded at Kūkaniloko. Linking the name Wahiawā to the presence of the gods and mana supports the desire to make this area a place of chiefly childbirth.

The name Kūkaniloko, "the sound that resounds from within," possibly stems from the geographical qualities of the location and traditional function of the site.[171] Located in the piko of the island, in a bowl formed by two mountain ridges, the acoustic dynamics at the site are tremendous. There are stories of underground lava tubes that connect the site with the far corners of the island. The sounds of the pahu drum Hawea brought from Tahiti could be heard across the island indicating the birth of a new chief[172]. Other names are also associated with Kūkaniloko: "Upright-singing-within,[173]";

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[170] Mary Pukui, Samuel Elbert and Esther Moʻokini. *Place Names of Hawaii*.(Honolulu: University of Hawaiʻi Press, 1974) 64
[171] Kepa Maly, "Historic Documentary Research" (Kapolei: State Historic Preservation Division, 1992)
[172] Kamakau. *Moʻolelo Hawaiʻi*. 1986, 18.
[173] Samuel Elbert. "Hawaiian Literary Style and Culture." (*American Anthropologist* ,1951), 53

"To anchor the cry from within,[174]" and, "An inland area from which great events are heralded.[175]"

6.2.02 ACOUSTICS

The bowl created by the surrounding mountains and flat kula lands that extend to the sea increase the acoustic properties of the site and emphasize the importance of signaling the arrival of a new chief. Lines from a well-known chant refer to the sound of the surf on the shore of Waialua booming into the uplands of Wahiawā and Līhu'e. Mary Kawena Pukui suggested kaona for the use of drums at Kūkaniloko. By signaling the birth of a royal chief with a loud noise the gods can be heard amongst the midst of Wahiawā and Līhu'e.[176]

6.2.03 HEKILI (THUNDERSTORMS)

The thunderstorms of Wahiawā on O'ahu are an important connection between the gods and the place. This would seem to play an important factor in locating the wahi kapu Kūkaniloko. Thunderstorm manifestations were regarded as the voice of the ancestral gods of the heavens welcoming an offspring of divine rank. The drums beaten during birthing ceremonies were the kanakas way of honoring the voice of the gods.

> "the birthing heiau, or temple, Kūkaniloko, situated on the plains of Wahiawā is where the island's most violent thunderstorms brought the mana of the heavens down to chiefly children born below.[177]"

It is understood that extreme natural events such as lightning, rain and thunder are associated with deities and chiefly events like births. Thunder is associated with Kānehekili. Whether Kānehekili was associated with birthing is not certain.

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[174] Somerset. Letter to kiyoshi Ikeda. (State Historic Preservation Division, April 12, 1994)
[175] Chareles Kenn. "Kūkaniloko – Birthplace of Oahu Ali'is". (Honolulu: Topgallant Publishing Co. 1978)
[176] Pukui, Elbert and Mo'okini *Place Names of Hawaii*. 1974.
[177] Lilikalā Kāme'eleihiwa. *Nā Wāhine Kapu: Devine Hawaiian Women*. (Honolulu: Ai Pohaku Press, 1999)

6.2.04 MOUNTAINS

The mountains in the area is and was a very dominate terrain feature. Much like the rest of the island, they give many characteristics and resources to the area. The Waiʻanae ridgeline, its peaks, and steep slopes define the western boundary of Kūkaniloko. As seen in Figure 15, the location of Kūkaniloko is equal-distant to the two mountain ranges along with its distance to the shores of Waialua and Pearl Harbor.

Mount Kaʻala is the tallest peak on the Waiʻanae ridgeline and notably the tallest on Oʻahu at 4,020 feet. The top is flat and the land is swampy at the peak. This was a Wao Akua, the home of the gods. It is believed that the moʻo or goddess, Kamaoha, is associated with the swamp pond (called Luakini) at the top of Kaʻala. One rarely sees her mentioned in stories, but she does appear as kaona (a symbol of Kaʻala) in chants of this area.

The goddess Kaiona is also said to have resided here. She would send out her iwa bird to help those lost in the forests. The mountain itself was addressed and honored with an oli by the visiting the sister of Pele, Hiʻiaka.

In comparison to the tallest peak, Kolekole Pass is the lowest valley. The valley provides a trail that allows access from the central plain to the Waianae coast. Kānehoa is the peak south of Kolekole pass at an elevation 2,720 feet. A ridgeline descends from Kānehoa to a high point called Maunauna. Maunauna is 1,772 feet in elevation and commonly referred to in mele.

These peaks and valleys are important to mention because they are connected to Kūkaniloko via celestial alignments. As mentioned before, Kūkaniloko is the piko of Oʻahu. These landscape markers in the mountain, help people orient themselves and reconnect to the piko, from where ever they are on the island. Other sacred cultural sites were also located along significant solar alignments, connecting Kūkaniloko and important mountain landmarks. Figure 15 shows these alignments, and how Kūkaniloko is believed to be the geographic center of the island.

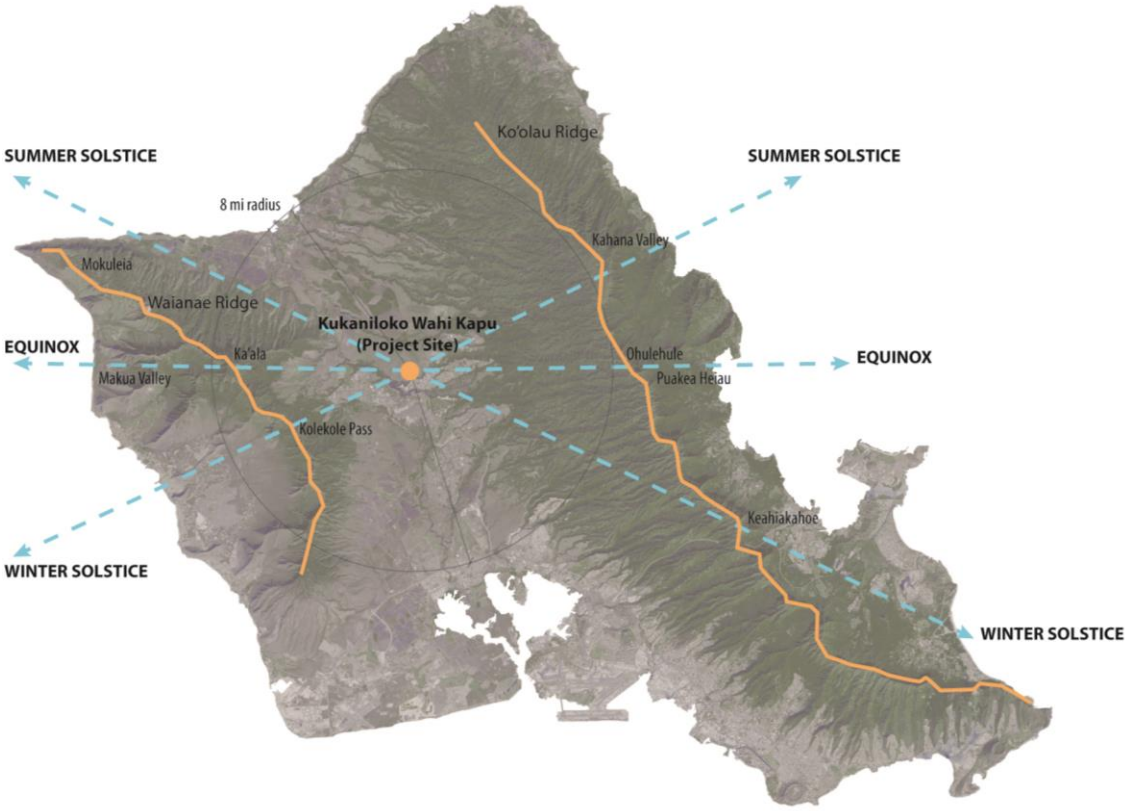

Figure 15: Oʻahu geographic analysis

6.2.05 NA LĀʻAU (PLANTS)

While the landscape of the chiefly center was one of fields and houses, descending forests of the Waiʻanae mountains on the west and the Koʻolau mountains to the east descend on these lands. The lower portion of the Koʻolau forest is a mesic forest that once had the largest sandalwood trees on Oʻahu.[178] Farther up the eastern slope is a colder, wetter, rainforest. The Waianae side is a dryer forest full of ʻōhiʻa, kauila, wiliwili, ili ahi, lama, hau, uhiuhi, hala, kupkupu ferns, and kukui[179]. The forest was a storage bank of ceremonial adornments, ritual offerings, and medicine. The forest on the Waiʻanae side would have been accessed for firewood, construction lumber or weapons manufacture.

[178] Office of Hawaiian Affairs. *Traditional Cultural Properties Report*. 2012. 60
[179] Office of Hawaiian Affairs. *Traditional Cultural Properties Report*. 2012. 86

The kula (flat) land between these forest lands was fairly open. The dry kula lands of the central plateau would have had agricultural crops, shrubs and low trees to support chiefly needs. Sweet potato fields and small scattered groves of trees stretched across the land while the bottoms of narrow gulches were cultivated with irrigated kalo.[180] Trees and shrubbery would have been present at housing sites. A dense area of house yards, small heiau, gaming areas, and Kūkaniloko once covered the flat kula areas in a roughly circular area. Plants such as kī (ti plant), noni (Indian mulberry, medicinal shrub), and other culturally significant plants indicate the location of sacred places. This is a symbolic link to today, created by the people who propagated the plant in ancient times and now. Ti does not self-propagate. In order to grow, it must have been planted.[181]

6.2.06 VISUAL GEOGRAPHIC GEOMETRY

Visual alignments from Kūkaniloko have huge importance to the site. Relating to the stones at Kūkaniloko to the surrounding landscape, Kūkaniloko was a place to study the changes in the environment, track the seasons, and interpolate spiritual prophecy on behalf of infant chiefs.[182] Views of the setting sun over the Waiʻanae mountain range, would be used to track the seasons. Coincident or not there are certain geographic landmarks that mark certain alignments during particular times of the year. For instance, during the winter solstice the sun sets through Kolekole Pass, and at the vernal equinox the sun sets behind the peak of Kaʻala. These landmarks are easily observed from Kūkaniloko. These landscape markers can be used to align oneself with Kūkaniloko when one is located out of sight of Kūkaniloko. Figure 16 is a photograph taken on June 21, 2014. The image shows a few of the landscape markers on the Waianae range and how they were used as a calendar.

[180] Office of Hawaiian Affairs. *Traditional Cultural Properties Report*. 2012, 186.
[181] Abbott. *Lāʻau Hawaiʻi: Traditional Hawaiian Uses of Plants*. 1992, 42.
[182] Office of Hawaiian Affairs. *Traditional Cultural Properties Report*. 2012, 242

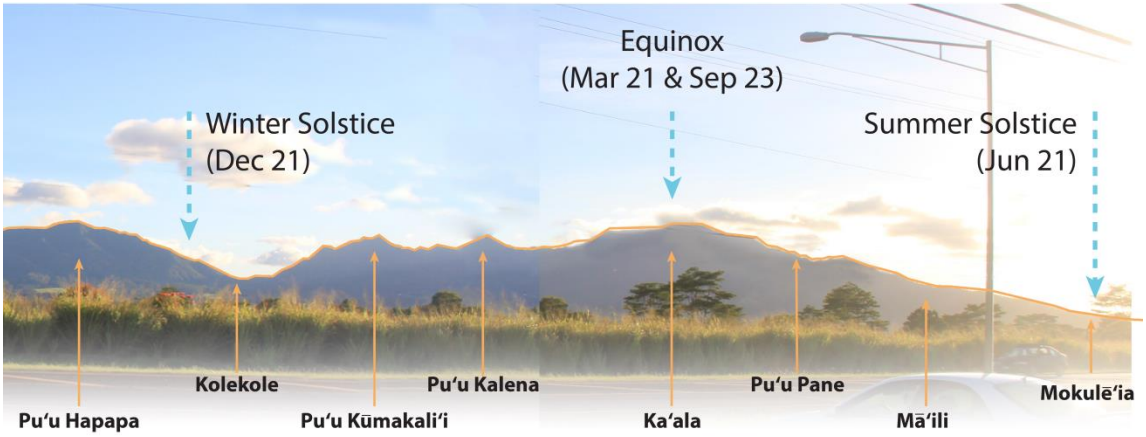

Figure 16: View of Sun location and Wai‘anae Range

Another naturally occurring visual geometry is the presence of the wahine hāpai (pregnant woman) silhouette on the Wai‘anae mountains. It is believed to be part of the reason Kūkaniloko is located where it is. The formation of the pregnant belly is Ka‘ala, the breast Kalena, and the head Kūmakali‘i. Some suggested Kamaoha, on the ridge spur beyond Ka‘ala, was part of a chiefly child emerging from a woman. It is believed that the mountain wahine watches over all of the births that occurred at Kūkaniloko.[183]

6.2.07 Access

Kūkaniloko is located near the junction of three major trails that connected area, to the central plateau. This made the area a vital hub. The southern Waialua trail from Pu‘uloa (Pearl Harbor) passes along the west edge of Kaukonahua Stream. It then crosses to the east edge just west of Kūkaniloko and then north down to Waialua’s shore. The western trail comes over Kolekole pass from Wai‘anae to connect to the Waialua Trail near Kaukonahua. A third trail came up from the west edge of Pu‘uloa and met the Kolekole Trail about halfway across.

[183] Office of Hawaiian Affairs. *Traditional Cultural Properties Report*. 2012, 261

6.2.08 PŌHAKU (STONES)

Most Hawaiian landscapes had natural stones that were present. Many had stories linked to them. Stories of gods, chiefs, and events were embedded in the creation and location of the stones. The stones acted as permanent fixtures of history, guardians of the present, and sometimes foreseers of possible events. The piko stone also known as the "Kāne-Lono" rock is oriented with its longest dimension pointing north-south, the short dimentsion points east-west and was used to track the seasons. This diamond shaped rock, shown in Figure 17, resembles the diamond-shaped star compass used by early Hawaiian settlers.[184]

Figure 17: Piko Stone
With set of concentric circles series of ridges believed to mark out times of year

[184] Kurth, Harry and Rubellite Kawena Johnson. The Birth Stones of Kukaniloko Heiau: Are They Oriented to Sky Phenomena? Manuscript, (Daughter of Hawai'i Archives. 1989), 8

The O'ahunui stone, similar in shape to O'ahu, was revered by navigators; however, the location is not disclosed to many. O'ahunui was a cannibal king of O'ahu petrified in stone. All who partook in the cannibalistic activities with the king would also turn to stone.[185] The Kolekole stone at the top of Kolekole Pass measured 8 X 8 feet. This upright stone marks the deities associated with the trail. The Keaninileihuaokalani Stone and its companion was a guardian of the Waialua trail. Story has it that two sisters from Kauai flew to O'ahu but mistimed the awakening of the sun and were thus turned to stone. The tongue shaped stone measures over five feet tall and three feet wide. According to Kahu Ricky Reveria, the Keanianileihuaokalani stone was a healing stone for the district of Wai'ihiawa. Today it is called Wahiawā. Through the rituals of birthing:

> "It was this mingling of blood and water that culminated into the healing mystic rains that fell upon the land, people and most importantly Keanianileihuaokalani giving the healing stone its healing powers."[186]

In 1927, the Daughters of Hawai'i, which at the time assumed responsibility of Kūkaniloko, had the Keanianileihuaokalani stone moved from Kūkaniloko and put on display near a cemetery on lower California Avenue, shown in Figure 18. During the following decade, hundreds of visitors came to the stone and left non-traditional offerings. In 1988, the Sawney family funded the construction of a marble shrine for Hindu worship.[187] Members of the Hawaiian community feel the "return of the Keanianilehuakalani stone to Kūkaniloko will mark the fulfillment of an obligation to kupuna and the rise of a restored kanaka maoli nation."[188]

[185] Sterling. *Sites of O'ahu* 1897, 90, 111-112
[186] "O'ahu Sites," http://oahu-sites.com/wahiawa-healing-stone/. Accessed Jan. 23, 2015
[187] http://www.staradvertiser.com/news/20100619_Storied_stone_taken_away.html?id=96713289
[188] "O'ahu Sites," Accessed Jan. 23, 2015http://www.staradvertiser.com/news/20100619_Storied_stone_taken_away.html?id=96713289

Figure 18: Keanianileihuaokalani Stone on Display in Stone Monument. [189]

6.2.09 WAI (WATER)

The fresh water springs of Helemano, above Kūkaniloko towards the Koʻolau mountains, provided cool baths for the chiefly community.[190] In the central plateau, water descends down from the Koʻolau mountains on the east and Waiʻanae ridgeline on the west. The streams carve out steep gulches with flat bottoms. In the flatter, central area of the plateau the stream erosion has increased the depth and width of the gulches.

6.2.10 UA (RAIN)

Rain was a very important phenomenon believed to be started by the steam created within the Earth. Scientifically, evaporation leaving the earth creates clouds which supply the earth with rain water.[191]

> "On the day of a royal birth, all work stopped in anticipation of the first healing rains generated from the blessed event. These rains were Waiʻihiawa, mystical rains tainted with the blood of royalty. This healing rain fell freely on the people who lived and worked in Kūkaniloko. The

[189] "Oʻahu Sites", Accessed Jan. 23, 2015, http://oahu-sites.com/wahiawa-healing-stone/.
[190] "Oʻahu Sites", Accessed Jan. 23, 2015, http://oahu-sites.com/wahiawa-healing-stone/.
[191] Malo. *Hawaiian Antiquities*. 1951, 12-13

essence of the royal koko, blood, still falls as evening rain and it is this rain that Keanianileihuaokalani desperately needs to regenerate"[192]

Different types of rain had different names. Names were dependent on the amount of water and direction inherently tied to the wind.[193] It rains 40 to 50 inches per year in the flat area near Schofield and Wahiawā.

6.2.11 MAKANI (WINDS)

The cold winds that descend down the mountain ridges from Kaʻala are called the Waikōloa and Waiʻōpua winds (sometimes Kēhau winds). They are known to carry the fragrance of the forests, the kupukupu ferns and nēnē grasses. From this understanding of the winds, one can conclude the central plateau is a cooler land. We know this to be true because Wahiawā and Mililani are still known to be cool today. The dew that comes down with these winds moistens the land.

6.3 UNDERSTAND TRADITIONAL PROGRAM

6.3.1 BIRTHING SITE

Each story of a chief begins with the birthplace; a place where the mana of the gods was first was established in the chief. The chant records the specific place where the caul, placenta, and navel cord were deposited. If a chief was born away from the ancestors' homeland, the father would return home to get a birth-gift embodying the mana of their ancestors. The gift was sacred and identified by the color ʻula (red).[194]

To legitimize the ranking of the new born child and establish the right to lead, other rituals were performed at the time of birth. There were also certain omens to indicate the future role of the king. Natural phenomenon were often associated with these omens.

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[192] "Oʻahu Sites", Accessed Jan. 23, 2015 http://oahu-sites.com/wahiawa-healing-stone/.
[193] Malo. *Hawaiian Antiquities.* 1951, 14
[194] "Polynesian Voyaging Society", Accessed March 12, 2014, http://pvs.kcc.hawaii.edu/ike/hookele/hawaiian_star_lines.html.

> "If the child really were a great chief, the heavens allegedly would burst forth with thunder and lightning, and there would be a heavy downpour of rain. A rainbow would arch over the area, with one end indicating the spot where the child had been born. A tradition describes how the piko (navel cord) of a newborn child was placed in the nearby Pōhaku Piko; if a rat stole the piko it was an omen that the child would grow up to be a thief, and allegedly the child was put to death."[195]

A child was to be born in the presence of 36 chiefs. The child would then be taken inside the Waihau of the Hoʻolonopahu Heiau (sounding of the pahu drum) to tie and cut the naval cord.[196] A description of the chiefly birth of Kakuhihewa describes the ceremonial process at the sleeping place consecrated by the kapu of Liloe, Kūkaniloko.[197] The south side of Kūkaniloko was 990 feet, and the western side 7,920 feet long. The Pahu drums would be beaten to indicate the birth of new chief.[198] Sometimes the makaʻainana would gather along the east side of the stream, and the servants along the south side.[199]

6.3.2 ASTRONOMICAL ALIGNMENTS & CONNECTIONS

The birthing sites of the high class aliʻi, Kūkaniloko, is situated geographically to connect the papahulihonua (realm of the earth) with the papahulilani (realm of the heavens) by means of celestial orientation. Hawaiians in traditional times had a close relational understanding of individual stars and star clusters. Names of heroes, deities, and places [some in Kahiki (Tahiti)] were personified in chants and mele. Seers (kilo or kilokilo) used the skies (day and night phenomena) for omens, and birth prophecies. Aligning the path of the Sun, stars, and moon against the prominent peaks of the

[195] Office of Hawaiian Affairs. *Traditional Cultural Properties Report*. 2012, 194
[196] Nakuia. "Thrums Hawaiian Annual" 1897 in *Sites of Oʻahu* .1912, 139
[197] Nakuia. "Thrums Hawaiian Annual" 1897 in *Sites of Oʻahu* .1912, 139
[198] Yent, "Interpretation Plan Kukaniloko Birthstones State Mounment Wahiawa, Oahu. State Site No. 50-80-04-218". May 1999
[199] Nakuia. "Thrums Hawaiian Annual" 1897 in *Sites of Oʻahu* .1912, 139

mountain ranges east and west of Kūkaniloko gave the priests a time calendar for spiritual interpolation and prophecy of each newborn chief.

The vantage point allows one to observe the celestial alignments which guide the telling of the genealogical story of the high chiefs and physically connects them to the parentless deities. This legitimized their ranking and established the right to lead. The rising and setting of celestial beings tells the cosmological lineage of ancestral chiefs.[200] The "Basket of I'o" of the parentless all-parent deity rises over Kaoio Point on the Ko'olau range.[201] The star of the beloved child of Kane passes over Kamaohanui on the Waianae range and sets over on the other side at Makua (parent) cave.[202] Setting in the horizon in front of Kaneana, Kane's Cave symbolizes the entrance to the womb of Papa, Earth Mother; thus completing the life cycle.[203]

6.3.3 CHIEFLY SCHOOL

Kūkaniloko is not just a birthing place of the ali'i, it is and was a center for learning. The location helps to teach about ancient thoughts and the moku (ie: kilo hoku, lua, lā'au lapa'au, lā'au kāhea). This is where the young ali'i would be trained to become managers of the people and the land.

However, such training generally did not occur in the most sacred areas of these chiefly or royal centers (luakini, pu'uhonua). The education of skills would take place near relevant resources. For instance, education on how to build a canoe would occur in the canoe hale near the beach, while other skills such as navigation might be taught in the chiefly center of Līhu'e-Kalakoa-Wahiawā. These trainings would most likely occur in the secular areas of the center away from the birthing site. Religious trainings or observances would take place at different heiau and even within the most sacred

[200] Best, "Maori Religion and Mythology" pp. 223-224; E.S. Craighill Handy, 'The Hawaiian Cult of Io,' 1941, 157- 158.
[201] Best, "Maori Religion and Mythology" pp. 223-224; E.S. Craighill Handy, 'The Hawaiian Cult of Io,' 1941, 157- 158.
[202] Kame'eleihiwa, "Hawai'i-nui-akea Cousins: Ancestral Gods and Bodies of Knowledge are Treasures for the Descendants," (Te Kaharoa: 2009), 42
[203] Kame'eleihiwa, "Hawai'i-nui-akea Cousins: Ancestral Gods and Bodies of Knowledge are Treasures for the Descendants," 2009, 48.

religious spaces of ruling centers such as the birthing and Waihau Heiau areas of Kūkaniloko.

It is important to understand that the original boundary of Kūkaniloko was not the five acre parcel seen today. The extent of the chiefly center refers to the wider central plateau that extended to the steeper slopes of each mountain range, this is depicted in Figure 19. Learning would take place at appropriate areas. As a rule of thumb, skills of religious ceremonies would be held in the kapu places or the inner most realms, because that is the only place where those ceremonies take place. Kapa making, lua fighting, and other educational experiences of the aliʻi children would happen in the outer rings of the chiefly complex. This idea of layering and cultural significance should play out in the management plan for the Kūkaniloko property.

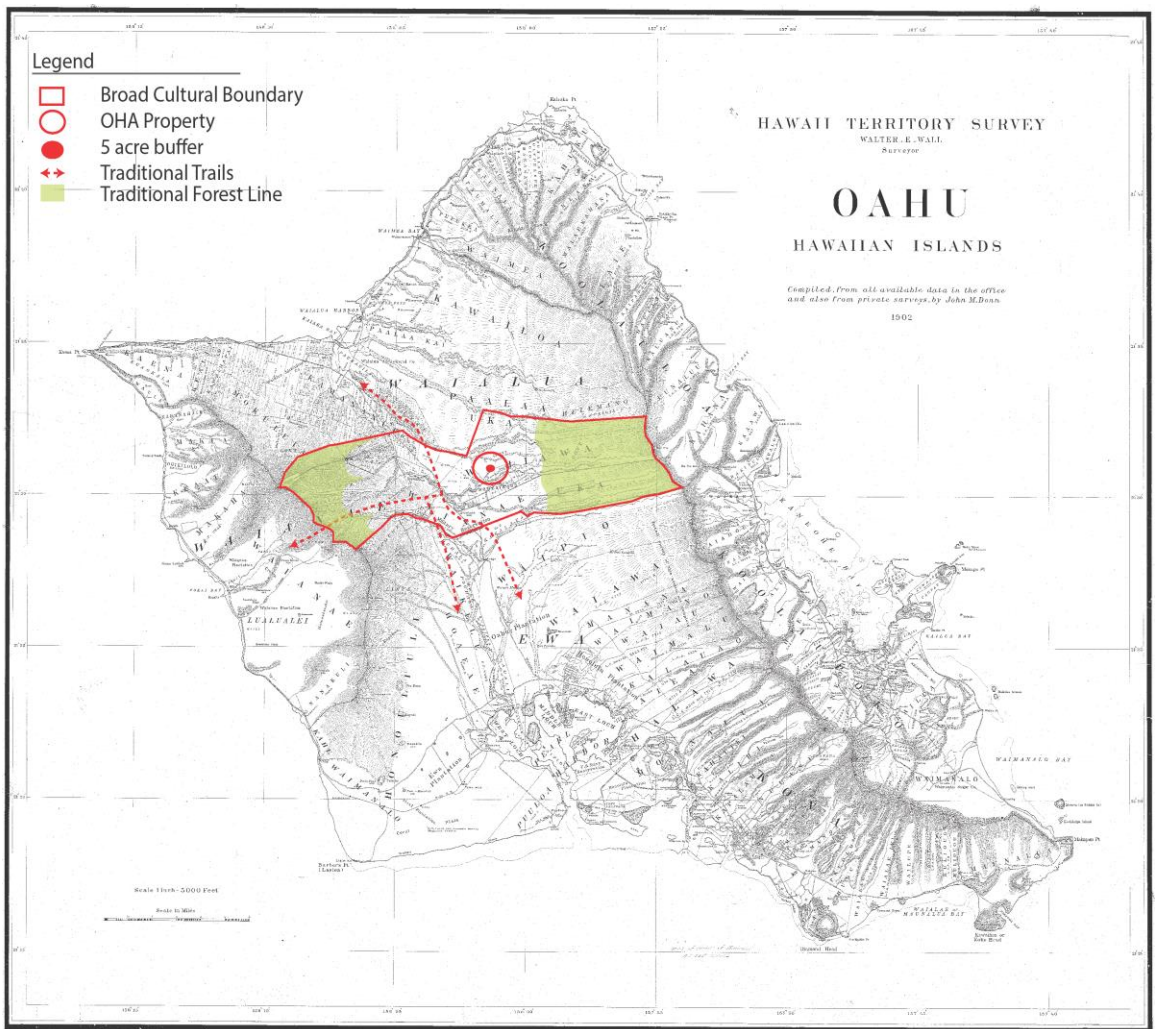

Figure 19: Cultural Boundary Map[204]

6.4 CONTEMPORARY WAHI PANA

A cultural site is comprised of two areas: the core, and the broader cultural landscape. The core includes the vicinity of land used for residence, practice, and cultivation. The broader cultural landscape area includes the area for hunting, gathering, or fishing. This broader landscape extends to the ahupua‘a, or moku boundary. It is the amount of land required to provide for subsistence, cultural and religious practices.[205]

[204] University of Hawai‘i at Mānoa Library. “Hawai‘i Territory Survey Map O‘ahu 1902.” Accessed Mar. 30, 2015. http://magis.manoa.hawaii.edu/survey.html
[205] McGregor. “Hawaiian Cultural and Natural Resource Management.” 1995, 10

In the case of Kūkaniloko the core would consist of the five acre boundary currently listed on the National Registry of History Places. The broader cultural landscape could be split into two subzones: the 500 acre parcel delineated by the Tax Map Key owned by the Office of Hawaiian Affairs (Figure 21); and the other being the 36,000 acres of the original central plateau of the chiefly district from the ridge of mount Kaʻala to the ridgeline of the Koʻolau. Each zone could then be assigned a special use and zoning designed to protect the cultural heritage landscape and legacy property of Kūkaniloko. The smallest zone would include culturally appropriate activities and landscaping. Access to this zone would be limited.

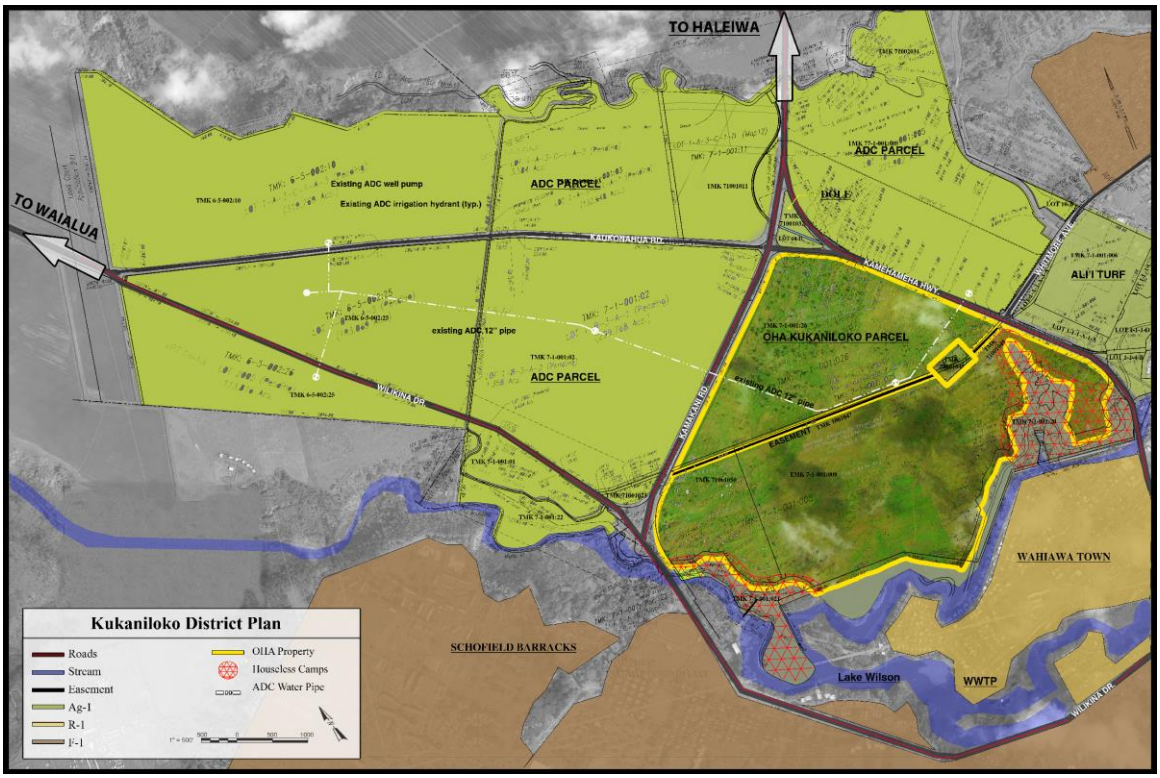

Figure 20: Tax Map Key map of adjacent properties.

The largest zone of the 36,000 acres can be zoned agricultural to help contribute to food self-sufficiency, preservation of open spaces and watershed lands. Regulations of this zone would limit development and aid in preserving the view and vista corridors of the mountains from Kūkaniloko. These view corridors could be held in a new classification category of conservation zoning.

The second 500 acre zone could service the land owner, OHA, by providing a Cultural Learning Center equipped with parking, restrooms, and educational signage for the community and tourist visitors. A structure located nearby could serve as a staging area for cultural practitioners during ceremonies. This 500 acre cultural buffer can be landscaped with organic food production to also contribute to Hawai‘i’s self-sufficiency, preservation of open space and watershed lands.

The main focus would be the protection of the Kūkaniloko stones (highlighted in Figure 21 under the red circle) and other associated cultural sites, such as Ho‘olona Pahu Heiau. The assumed position of this heiau is marked by the pahu icons.[206]

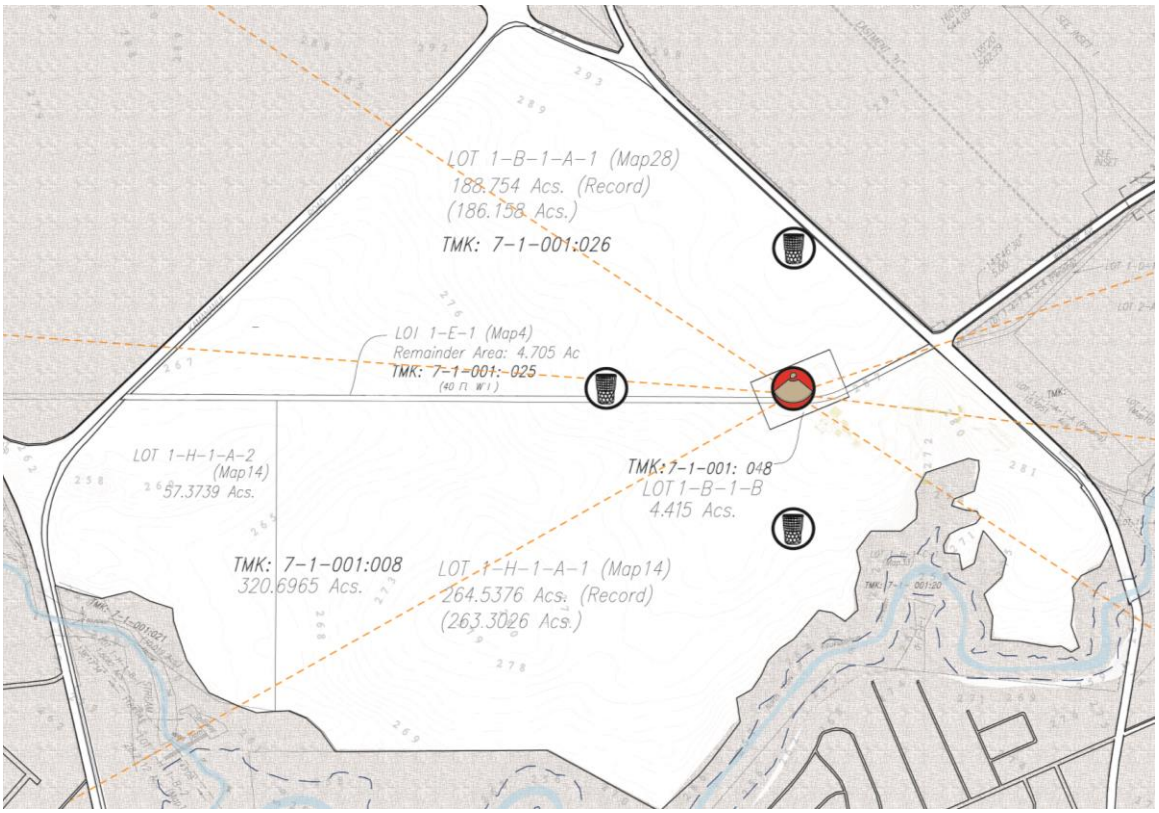

Figure 21: 500 acre property showing location of stones and significant heiau

6.5 Conclusion of Site Logic Phase

The knowledge learned about Kūkaniloko portrays the continued importance of this wahi pana to the identity and well-being of Native Hawaiians. Kūkaniloko is a place

[206] Kamakau. *Tales and Traditions of the People of Old.*1991, 26

where cultural traditions are still practiced today. The Hawaiian culture is dynamic and alive. Kūkaniloko is a mechanism where culture can flourish and be passed on to future generations. Although there have been drastic changes to the landscape of Kūkaniloko, its sacredness to the Hawaiian community has remained. Our kupuna say that while every place is special, not every place is sacred. The site has been and always will be a wahi pana due to the interaction between the akua and ʻāina at Kūkaniloko. For generations, people have sought to tap into the source of mana existing at Kūkaniloko. Figure 22 is a visual representation of the gather that occurs to connect to the mana, which occurs between the akua and ʻāina. This started with Hawaiians, but in recent years, many cultures have traveled to the site for spiritual rejuvenation and inspiration. It is for this reason why Kūkaniloko is believed to be the piko of Oʻahu, the center of the Hawaiian Archipelago, and the center of Oceania. Kūkaniloko is the spiritual and physical center of the Hawaiian Nation, ko Hawaiʻi Pae ʻāina. Kūkaniloko resembles a rise in cultural sensitivity for not just Hawaiians, but for Oceania and all indigenous cultures around the world.

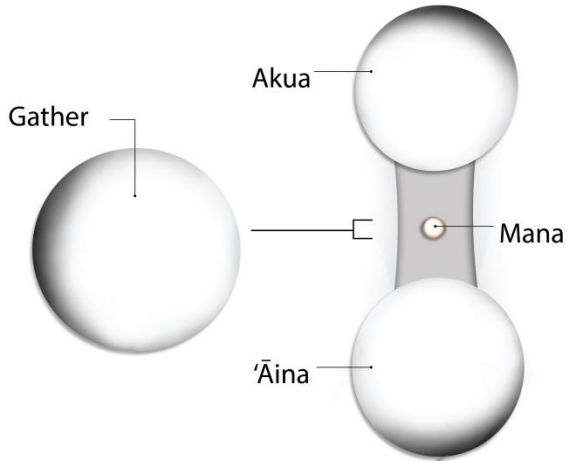

Figure 22: Mana is found at the intersection of Akua and ʻĀina.
(Thus the reason for people gathering to seek access to such mana.)

Kūkaniloko is a modern puʻuhonua. Is serves as a cultural learning center for Hawaiians and foreigners that encapsulates history, traditional cultural and spiritual customs, and beliefs. It is a place where Hawaiian people can flourish and reconnect to the ʻāina and rejuvenate their minds, bodies, and spirits. While at Kūkaniloko, one can

feel an immense sense of ho‘omana -- an empowering sense of pride for Hawaiian culture and kuleana.

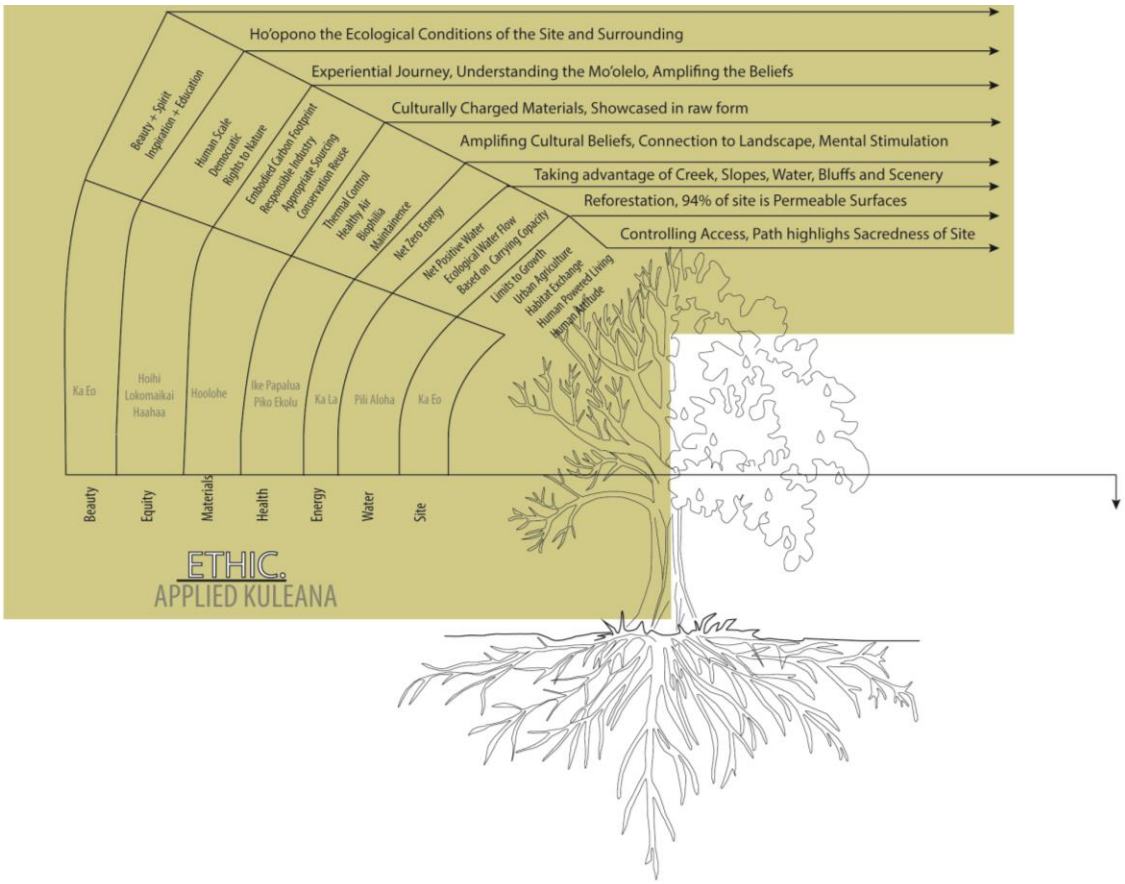

Figure 23: Ethics Phase:
(Application of the Living Building Challenge)

6.6 ETHICS PHASE

6.6.1 APPLIED KULEANA

The designer’s kuleana is to bring together the best practices of traditional and contemporary design strategies to choreograph an architectural environment and landscape that encourages a culturally appropriate experience. This will educate visitors about the site mo‘olelo. The design for the Kūkaniloko Center of Culture is part of a greater cultural revival initiative. Figure 23 along with the Application Matrix in the appendix explains how cultural influences along with the Living Building Challenged were used in the design process.

The first priority is to highlight the piko of culture -- the stones of Kūkaniloko. Creating a reforested buffer will help hoʻopono the ecological conditions of the site, while creating an opportunity for agricultural revenue that aids financial obligations of the site. The large scale reforestation of the property will establish a cultural kipuka of native plants in the surrounding ecology. Developing a Cultural Awareness Center will maintain the accuracy of the knowledge shared about Kūkaniloko. Finally, a commerce facility will help control access to the stones while generating additional revenue to further support the financial burdens of the site.

The goal is to allow one to experience the site's moʻolelo through a path which honors the timeless significance of the chiefly center. Access to the center requires a protocol to maintain the sanctity of the site. This is done via access management spaces. The pathway provides guidance for mental preparation and opportunities for one to humble oneself. The mind, body and soul are purified prior to entering the presence of the site. This is done through a series of subtle purification spaces. This series will be discussed in more detail during the Translation subchapter. The pathway itself is tied to the alignments and topography that give this site its cultural significance. Alignments to landscape markers and natural phenomenon connect the activity on land to the akua and to generations past, present and future. Using architecture and landscape to choreograph and encourage a liminal and culturally appropriate experience, the end goal is to fill the user with wonder, amazement and the sense of privilege inspired by this cultural wahi pana.

6.6.2 DESIGN GOALS

The design of the Cultural Awareness Center is aimed to: 1. hoʻomana the site; and, 2. maintain the sanctity of the site by providing appropriate programmatic spaces and cultural thresholds which limit and codify behavior prior to entering the buffer zone. The overall design takes advantage of the Kaukonahua gulch, slopes, creek, water, bluffs of the Lihūe plain and the scenery of the Koʻolau and Waianae mountain ranges. The natural environment offers high potential for sustainable initiatives. The path to the cultural center is seen as a progression of cultural enlightenment that provides

opportunities for mental preparation prior to interactions with the stones. To transition from the gathering space to the mana source, a series of protocol gateways will maintain cultural sanctity. Figure 24 shows this as a series of spaces. Figure 25 lists the different types of spaces.

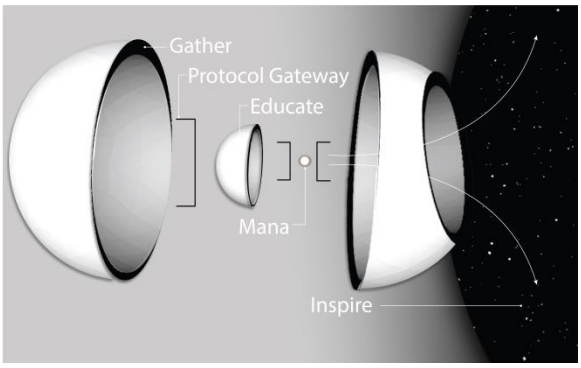

Figure 24: Protocol Gateways
(Protect the cultural sanctity when accessing the mana of the site.
Gathering and education spaces serve ancillary programmatic needs.)
.

The process of entering the sacred site begins with the understanding that everyone coming to the site comes with a preexisting knowledge base and background. The goal is to get all viewers to understand the cultural importance of the stones and to have humility in one's heart prior to accessing the site. Once exposed to the power of the site, the inspiration gained is limitless. This can be taken to all ends of the Earth and shared with all. The power of aloha is a gift from Hawaiians. The goal is to share this with the world.

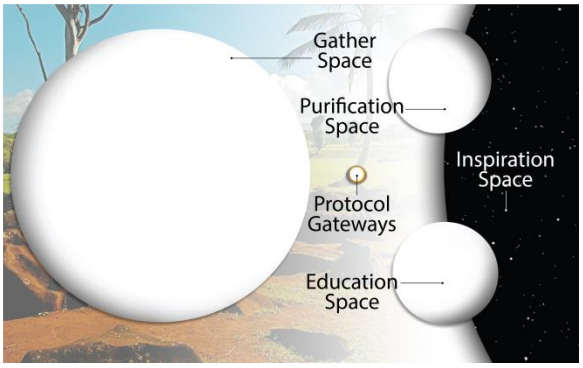

Figure 25: The different types of spaces
(Result of the site analysis and mana access control methods.
All programmatic spaces are in support of maintaining the sanctity of the stones.)

The progression of spaces follows a cultural protocol that reflects the birthing protocol established during the time of Kapawa. Starting with a gathering place, purification, and education culminates in the most sacred space, the stones. Each space is marked by a transition threshold that codifies mental preparation.

6.7 TRANSLATION PHASE (DESIGN ELEMENTS)

6.7.1 ENGAGE

The current landscape is classified as a large expansive landscape. Besides the stones, viewers have little to focus on and can thus center their thoughts. Along the Kaukonahua gulch dense vegetation obstructs views to the outside world. The existing open landscape discourages exploration because an understanding of outlying areas is easily gained from one position. By creating an engaging cultural landscape that allows for full mental fatigue recovery, the user's journey can be beneficial to one's psychology and infusion of cultural values, it will also encourage exploration and an acquisition of knowledge. Agro-forestry which takes place throughout the majority of the property will contribute to biodiversity of the place and provide wind breaks and focal corridors to landscape markers on the distant horizon.

The focal point of the site is centered on the location of the stones. The design guides the visitor along a prescribed path from the gathering area, commerce spot, through the forest, to the education center, and finally at the stones. Figure 26 is a conceptual adjacency diagram showing the flow of spaces and how one will transition from the secular to the sacred. Figure 27 illustrates how the conceptual adjacency diagram is realized on the site. Figure 28 is the master plan.

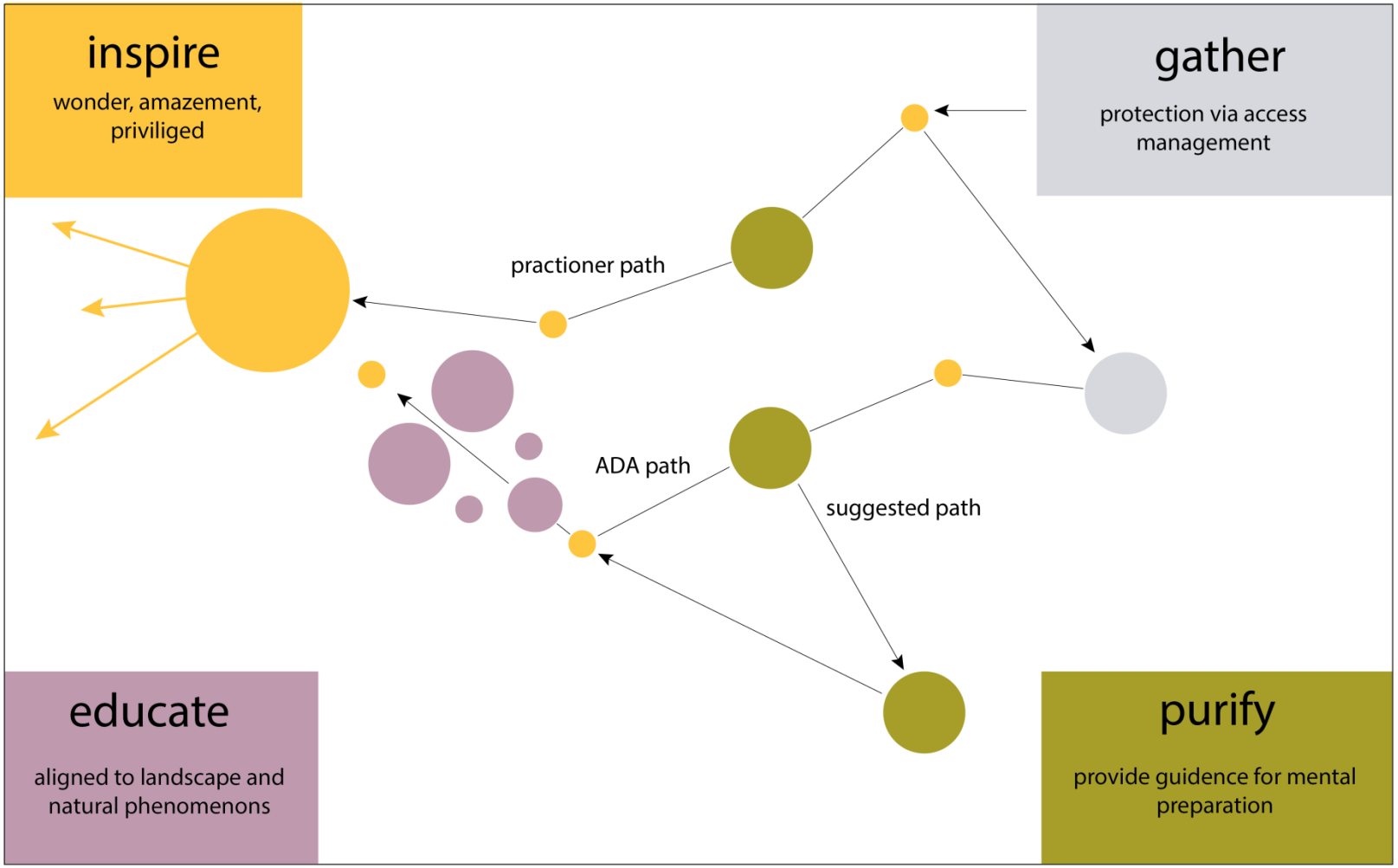

Figure 26: Conceptual adjacencies diagram

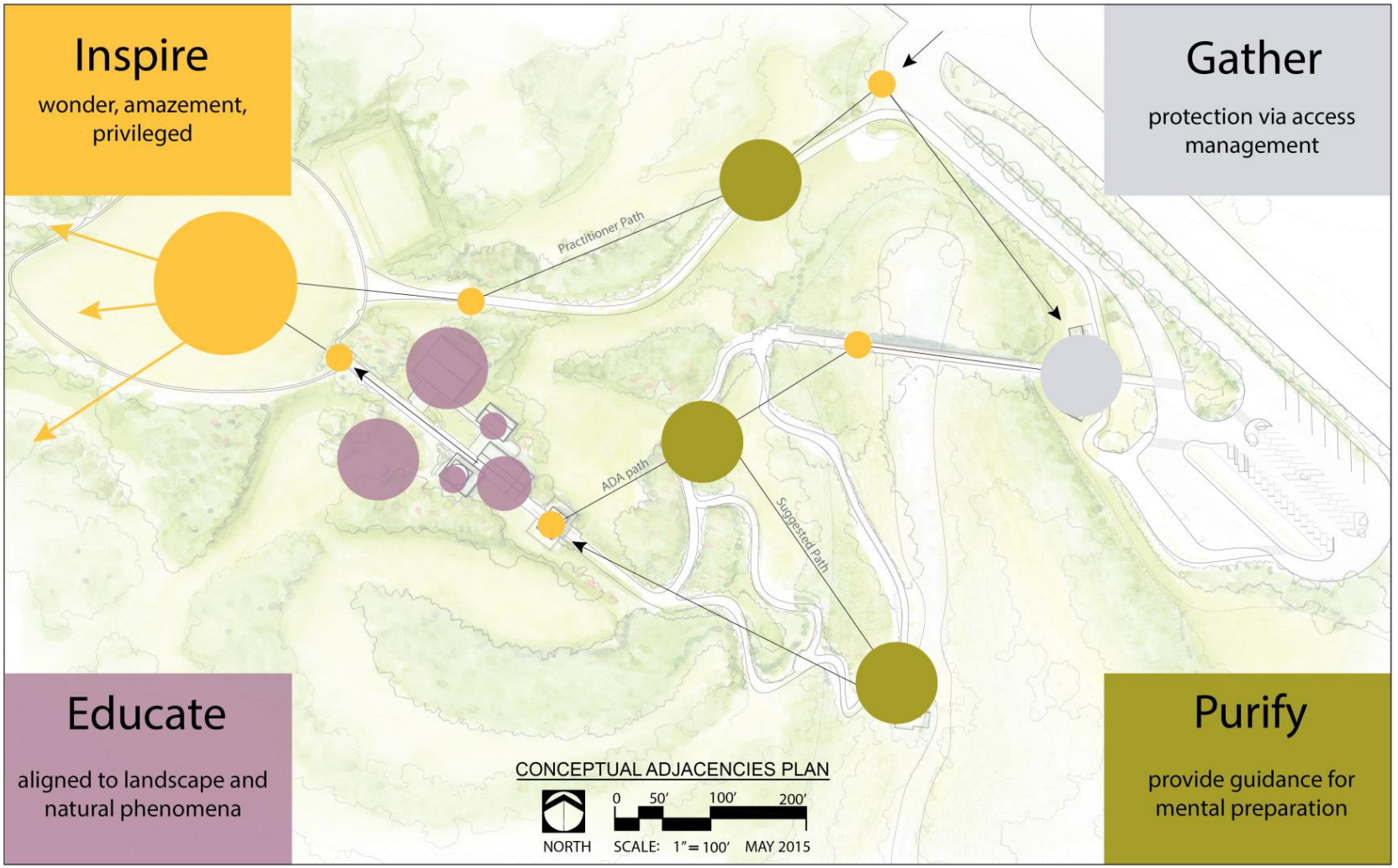

Figure 27: Conceptual adjacencies relative to site

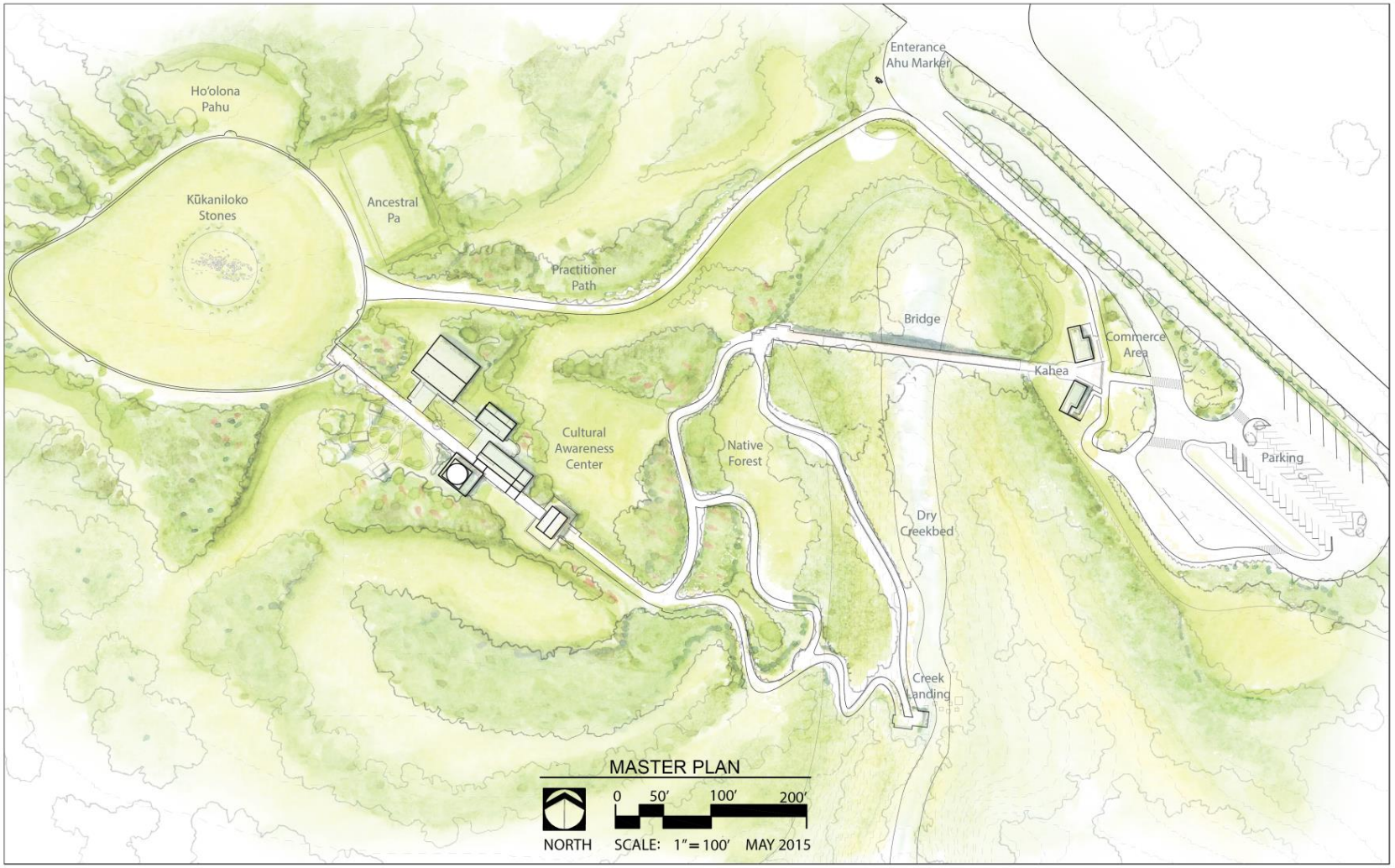

Figure 28: Master Plan

Figure 29: Author created rendition of the entrance to the Wahi Kapu.
(The view shows the Ahu Marker in the foreground and the Practitioner Pathway to the Stones in the distance.)

6.7.2 THRESHOLDS

Thresholds are characterized by protocol gateways. These gateways preserve the sanctity of the cultural site by marking the physical transition towards the sacred space. They also mark the stages of mental preparation during the movement towards the stones. Using landscape markers to indicate the transition into a sacred place was common during traditional use of Kūkaniloko. In the Voices of Truth video, "Kūkaniloko – Birth of a Nation – A Visit with Tom Lanchenko," The Kahu of Kūkaniloko talks about how there would have been a series of markers in the form of rocks positioned throughout the landscape that would signal how close commoners were allowed to get to the chiefly center without encroaching on the kapu land.[207] If the boundary was crossed, this would be punished by immediate death. [208]

[207] The Koani Foundation. "Kūkaniloko – Birth of A Nation" A Visit With Tom Lenchanko. *YouTube* video, 27:11. Feb. 14, 2009. https://www.youtube.com/watch?v=saIYC5Dzyyg
[208] The Koani Foundation. "Kūkaniloko – Birth of A Nation" A Visit With Tom Lenchanko. *YouTube* video, 27:11. Feb. 14, 2009. https://www.youtube.com/watch?v=saIYC5Dzyyg

Thresholds are marked by culturally charged architecture, which in most cases stimulates strong psychological meanings. Figure 29 is an artistic rendering showing the arrival perspective. The ahu altar with kapu sticks near the entrance of the site, tell the visitor upon first arrival that this is a wahi kapu, a very significant place where a person should act respectfully.

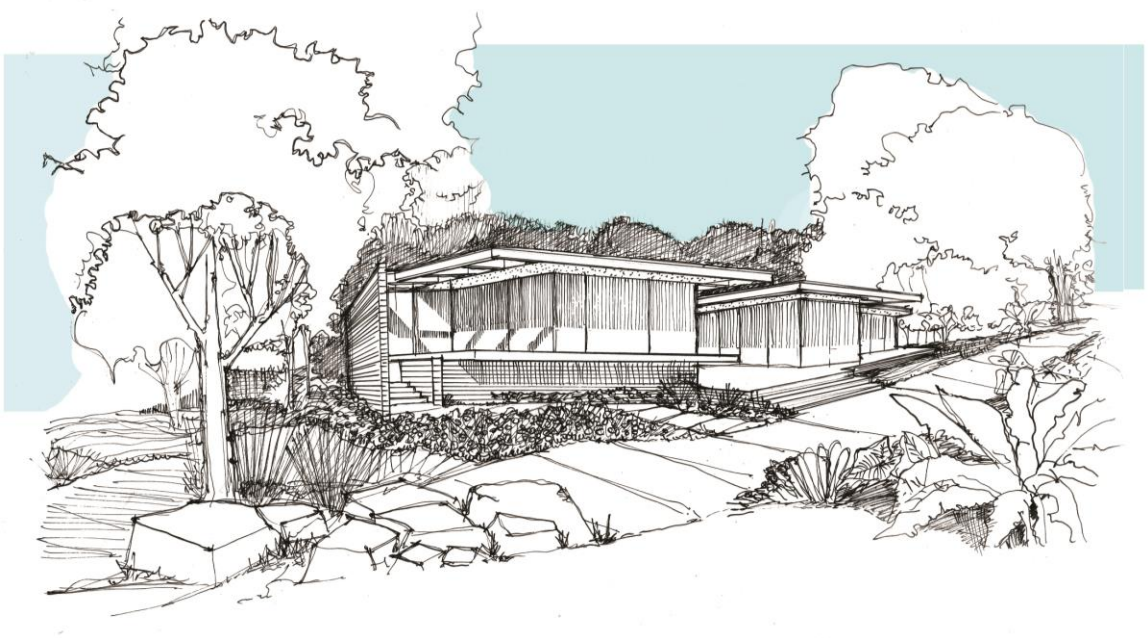

Figure 30: Author created rendition of the Commerce Area

GATHER ZONE

Providing an initial gather zone on the edge of the property closest to Wahiawā town allows for the transition to sacred to happen in incremental stages. Arriving at the existing entrance, one first sees an ahu marker signifying arrival at a wahi kapu. The entry driveway turns down toward the gather zone and parking lot. This area of the property instills in the user the feeling associated with site sensitive design through the aesthetic of porous pavers, native landscaping and a dual-purpose photovoltaic array used for water catchment and shading. In the parking lot zone, one will also find a fFood and gift shop along with a ticketing office. All commerce funds raised will go back into protecting the site. Once the decision is made to enter the site, one will walk through the center of the two buildings where another gather zone is created. Figure 30 illustrates the commerce buildings.

PROTOCOL 1: KAHEA

This is where the tour will begin. Led by a cultural advisor, the groups will kahea by asking permission to enter the sacred area. Once complete, the group will continue to traverse over a bridge above the Kaukonahua gulch. This begins the Purification stages.

Figure 31: Author created rendering of the Bridge, Path and Creek.
(Rendering captures the Atmospheric Quality of the Purification Spaces.)

PURIFICATION 2: BRIDGE

The bridge follows the celestial alignment of the star Kauluakoko (Betelgeuse) axis with the piko stone. This star is part of the Pa category of ruling stars. The name of the star Kauluakoko means, "blood of the ancestral homeland." It is part of the constellation Orion. The Orion constellation has many meanings in Hawaiian belief. The name of Orion is Ka Heihei O Nā Keiki, the snare game of children; it is a string game which captures the hand of a friend. The constellation also has an alignment of three stars (Orion's belt) which are heard in moʻolelo as being the three canoe paddlers who paddle to different islands in the Pacific. This moʻolelo is not only told in Hawaiʻi, but also many parts of the Pacific; thus connecting Kūkaniloko to families around the Pacific. On the journey across the bridge, one learns the importance of using celestial

and landscape markers for navigation. The bridge also provides a new visual vantage point prior to entering the wahi kapu. Metaphorically, this marks the beginning of the paradigm shift that helps understand culturally significant areas and how they can transform / inspire our life.

PURIFICATION 2: FOREST

Once across the bridge the meandering path continues through ecologically responsible landscaping and culturally significant medicinal plants. These plants were used in ceremonies and daily life at Kūkaniloko. This reforested area educates the experiencer in the natural familial cycle, genealogy of plants, and ecology. In this area, one may witness cultural practitioners harvest plant materials to be used in cultural activities. Also along this path, the user first view of the stones and cultural center is framed. The view is focused on the Hale and the Halau, thus keeping the mindset on tradition. The sight of the modern buildings is not seen until quite later in the journey.

There are multiple pathways through the forest. One, simpler direct pathway to the center is for the elderly. The other path takes you on a journey down a 1:20 slope pathway to the edge of the creek. Figure 31 illustrates how the purification spaces are linked together and how the atmosphere would be densely vegetated

PURIFICATION 3: CREEK

The journey down the slope comes to rest alongside the creek. The significance of fresh water has been discussed in earlier chapter (see page 4). The water on site comes from the fresh water springs of Helemano. This is where aliʻi would bath themselves. The water here was also used in cultural protocol. The mixture of aliʻi blood and water made the rocks sacred. The visitor learns the story of the Keanianileihuaokalani stone and the healing rains of Wahiawā. They are reminded of how the loss of native vegetation has resulted in a loss of culture and environmental degradation. For Hawaiians, the health of the culture is directly tied to the health of the landscape. The educational journey continues as the visitor approaches the cultural center. Figures 32 and 33 show the site how the cultural center relates to the stones.

PROTOCOL 2: KAHEA HALE

From the creek, the path makes its way back up the slopes towards a traditional style hale. The hale serves as a gathering place for the group to reconvene and wait prior to entering the cultural center. The hale and the center are both on the winter solstice axis that aligns with the stones and Mokuleia in the distance. From this point, a sense of reverence is enhanced while continuing along the path through the formal education center kau hale style complex.

The education that happens on the east side of the axis relates to royal moʻolelo (seen in the Figure 33 as purple space), while the west side is about star gazing (seen in the Figure 33 as green space). The east side of the axis has more built / masculine structures, while the west side axis is predominantly feminine / landscape. This creates a balance between Kū and Hina. In this interaction, the birth of knowledge happens. All program information dissemination is designed to highlight the significance of the stones.

EDUCATION 1: INFORMATION CENTER

The information center provides a place where all of the subtle education that has happened along the journey is reinterpreted in a more direct manner. This center provides programmatic space for educational alcoves in a more western information sharing style. The use of information desks, boards, video, and artifacts are all found in this space.

EDUCATION 2: PLANETARIUM

Once outside of the information center, the group gathers and waits prior to entering the planetarium. The planetarium located on the western side of the axis allows the traditional use of the site to be interpreted with modern understanding. Here, celestial observations can happen during the day. The locational importance of the chiefly birthing center can now be understood by visitors. On the inside of the dome room, images of planets and constellations can be tracked across the sky and their interaction with the landscape at Kūkaniloko can be seen.

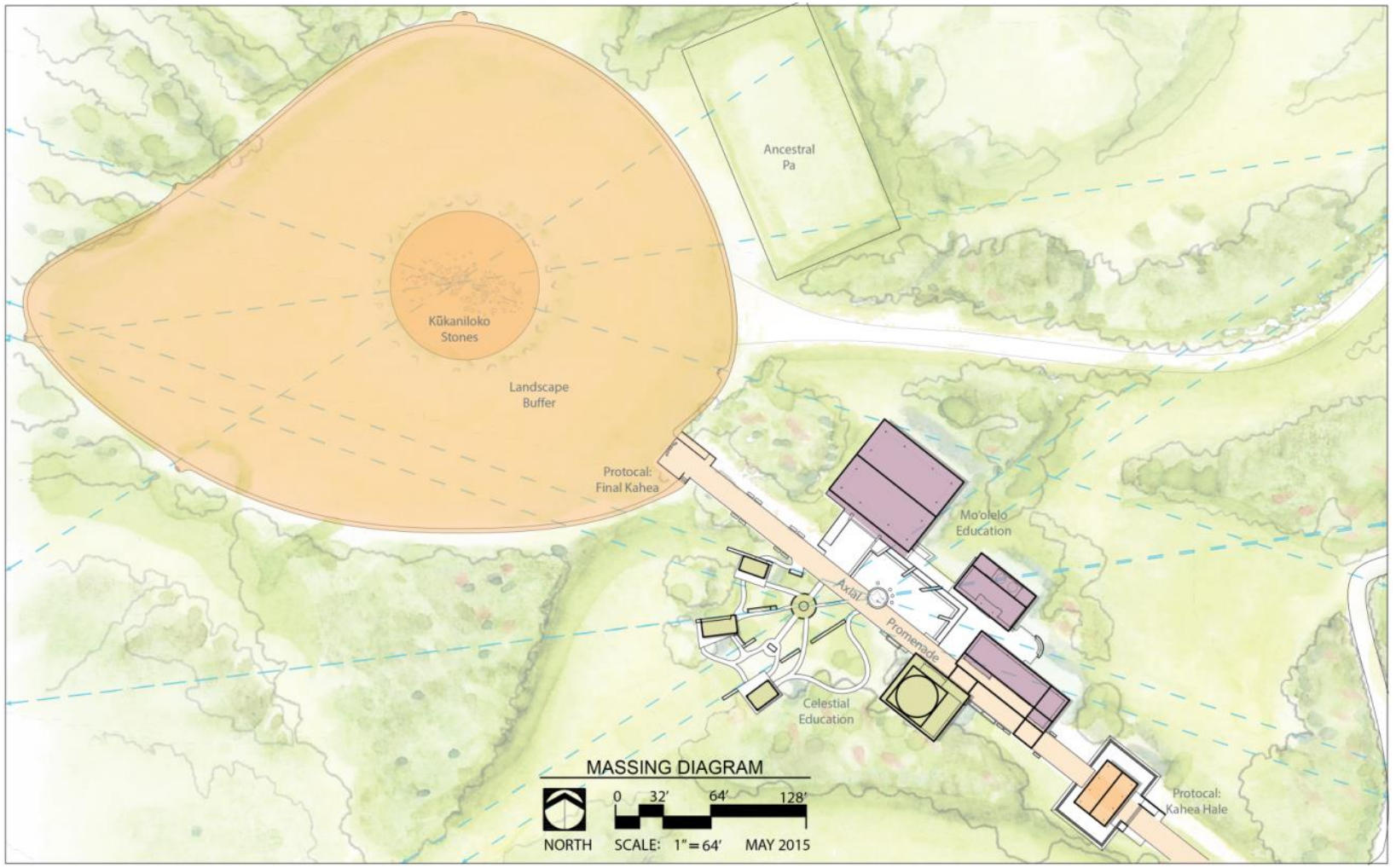

Figure 32: Conceptual Massing Diagram

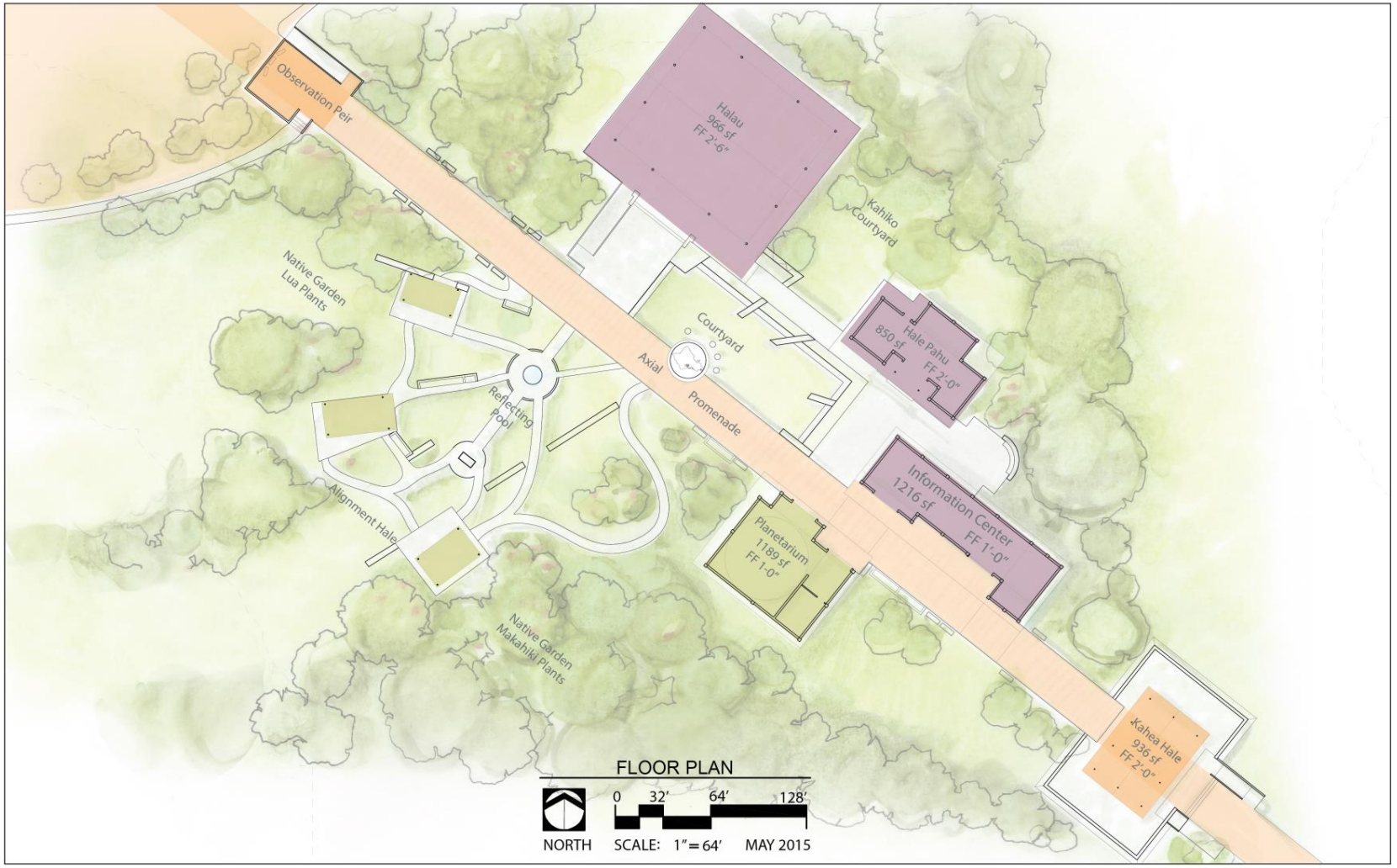

Figure 33: Cultural Awareness Center Floor Plan

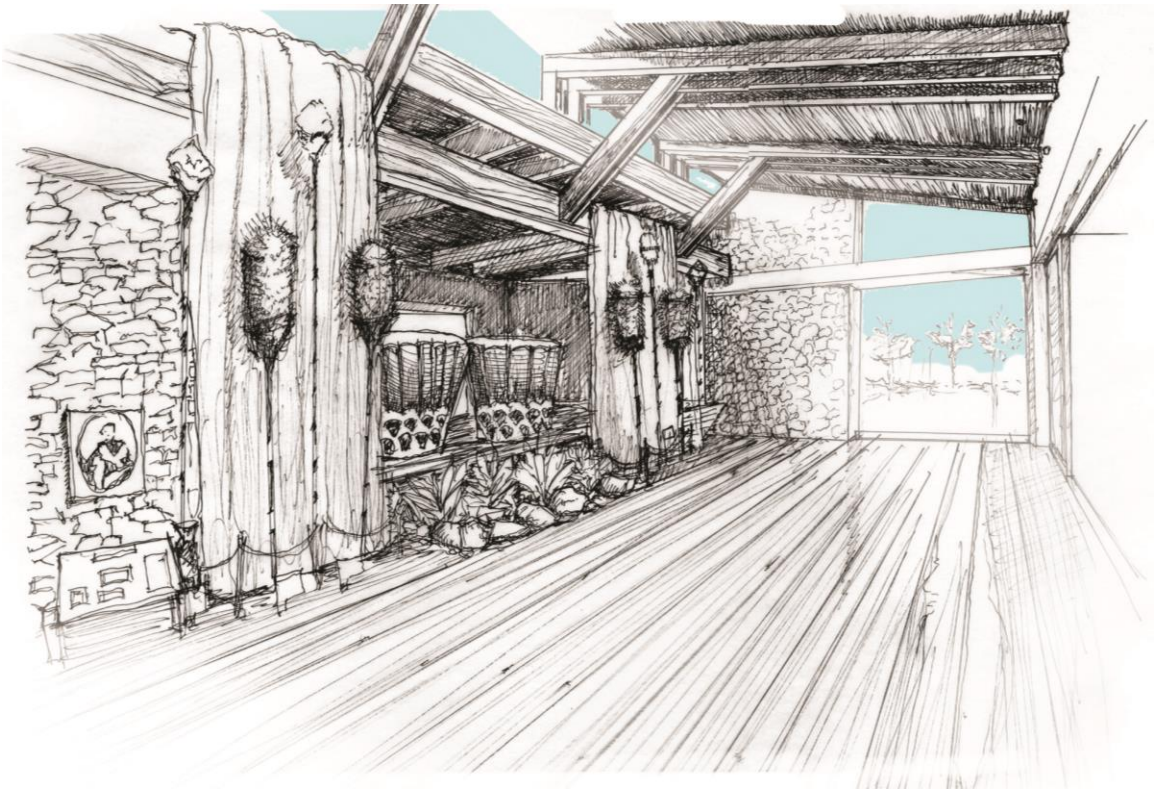

Figure 34: Author created Interior Perspective of the Hale Pahu.
(Rendering Captures the Quality of Light and Material Palette of the Space.)

EDUCATION 3: HALE PAHU

Directly in line with the planetarium exit on the eastern side of the axis is the Hale Pahu. Inside this 850 square feet hale is a recreation of the sacred temple drums: Hawea and ʻOpuku. In an honorary fashion, the drums are put on display and separated by a landscape buffer lit from above. Showcasing the sacred drums under a lower ceiling height surrounded by natural materials gives the feeling of the power these drums possessed when they were played. Figure 34 illustrates the interior atmosphere of the Hale Pahu.

EDUCATION 4: HALAU

On the same side of the axis is the halau, a large open air gable roof building designed to hold medium to large gatherings. The floor space is 48 feet by 56 feet. This is the same dimensions as the Merry Monarch Stage in Hilo, Hawaiʻi. This space serves as a practice area for hula dancers and musicians on sacred ground. The courtyard

between the halau and the hale pahu allows subsequent practice sessions to be held on the grass. This could also be used for lua training. The sacred drums are made visible through a window to remind cultural practitioners of the significance of the area and who they are performing in front of.

Figure 35: Reflecting Pool used to study the Stars.
(Cultural Awareness Center is modeled after the Kau Hale.
Negative Space between buildings preserves Solar Alignments.)

EDUCATION 6: COURTYARD

The central courtyard acts as the piko of the information center. This preserved open space is for outdoor gatherings and education at the heart of the cultural education center. The negative spaces of the kau hale information center preserves view corridors of the landscape markers used for the solar vernal equinox and solstices. The rendering above helps to show how the roof heights never pass the height of the mountain. The location of coconut trees can be used to mark the location of the rising sun at the solstices and equinox. The split shed roofs of the information center and the hale pahu are designed to catch the rising light of the winter solstice sun (Figure 37 roof plan). The landscape plan also radiates out, with tree heights designed to preserve the views toward the mountains. Figure 35, shows the view angles to the surrounding mountain ranges, thus the roof heights and landscape plan are designed not to disturb views of the ridge. In the center of the courtyard is a rock garden, featuring a stone shaped like the island of O‘ahu surrounded by course North Shore sand. The island stone serves as a compass and

focal point for discussing how Kūkaniloko is connected to different parts of the island. It shows the cultural piko of O‘ahu at the physical center of O‘ahu.

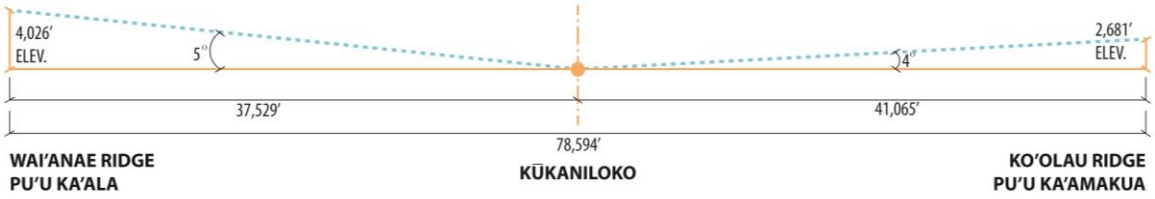

Figure 36: Distance diagram
(Showing relative view angles from Kūkaniloko to mountain Peaks)

EDUCATION 7: REFLECTING POOL

The reflecting pool recreates of the practice of studying the stars by looking at this reflection in the water. One of the stones at Kūkaniloko was a basin used for this exact purpose. Astronomers would look down at the water and familiarize themselves with the tracking of the stars above. This is envisioned to be a very calm and self-reflective space. The idea is that small intimate groups could gather around the pond. Led by a cultural practitioners, users learn the mo‘olelo of the stars and how they have been guiding the people of Hawai‘i for generations. This act of studying the stars through reflection is replicating the same activity that the ali‘i children would have done under the guidance of kahuna. Figure 36 illustrates the scenery around the reflecting pool and courtyard.

The reflecting pool doubles as a water reservoir. It is part of a storm water management system that incorporates rain gardens, bio-swales, and percolation trenches and French drains. Figures 38 and 39 illustrate a few of the sustainable strategies incorporated in the plan and sections of the design.

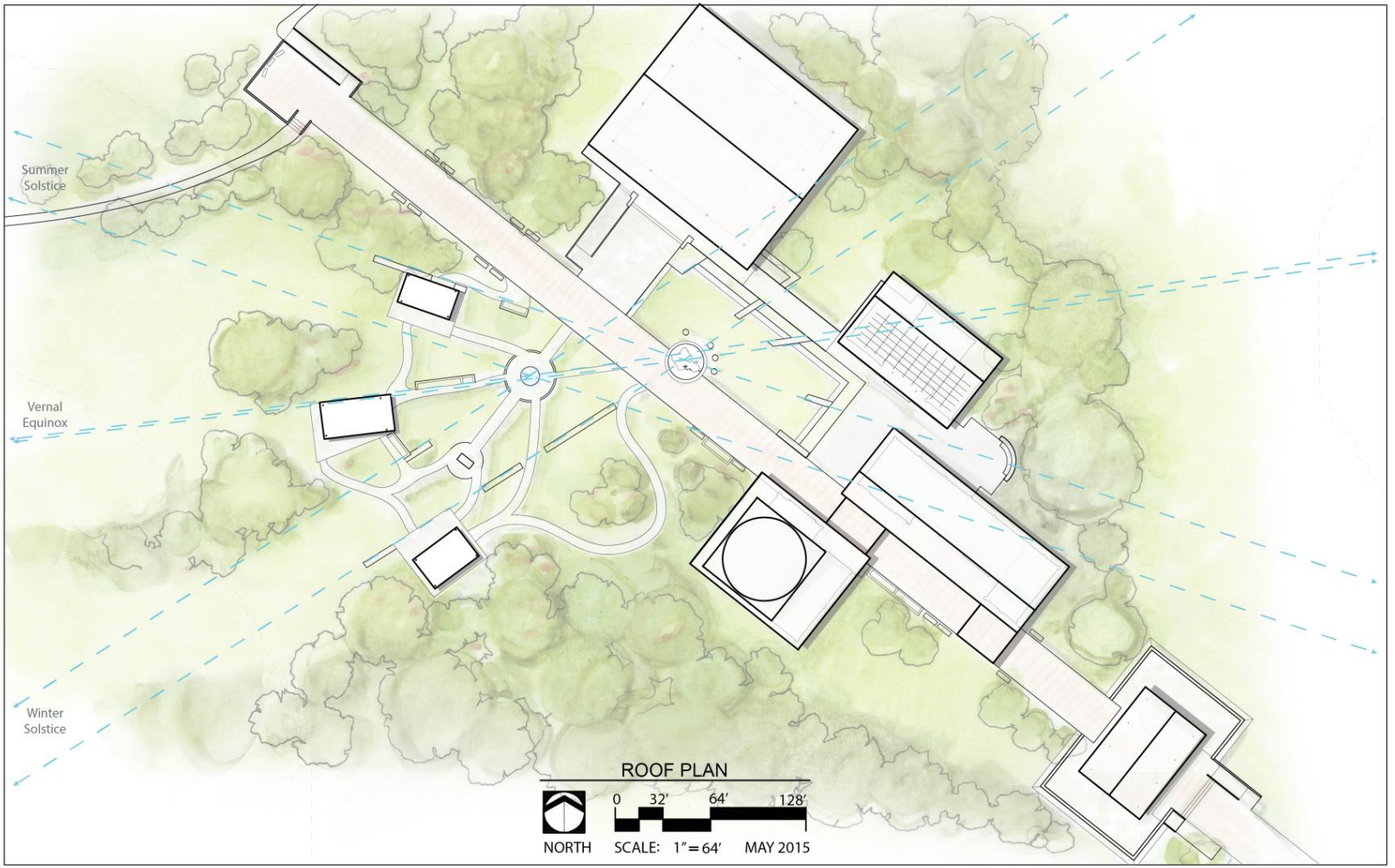

Figure 37: Site Plan with Solar Alignments

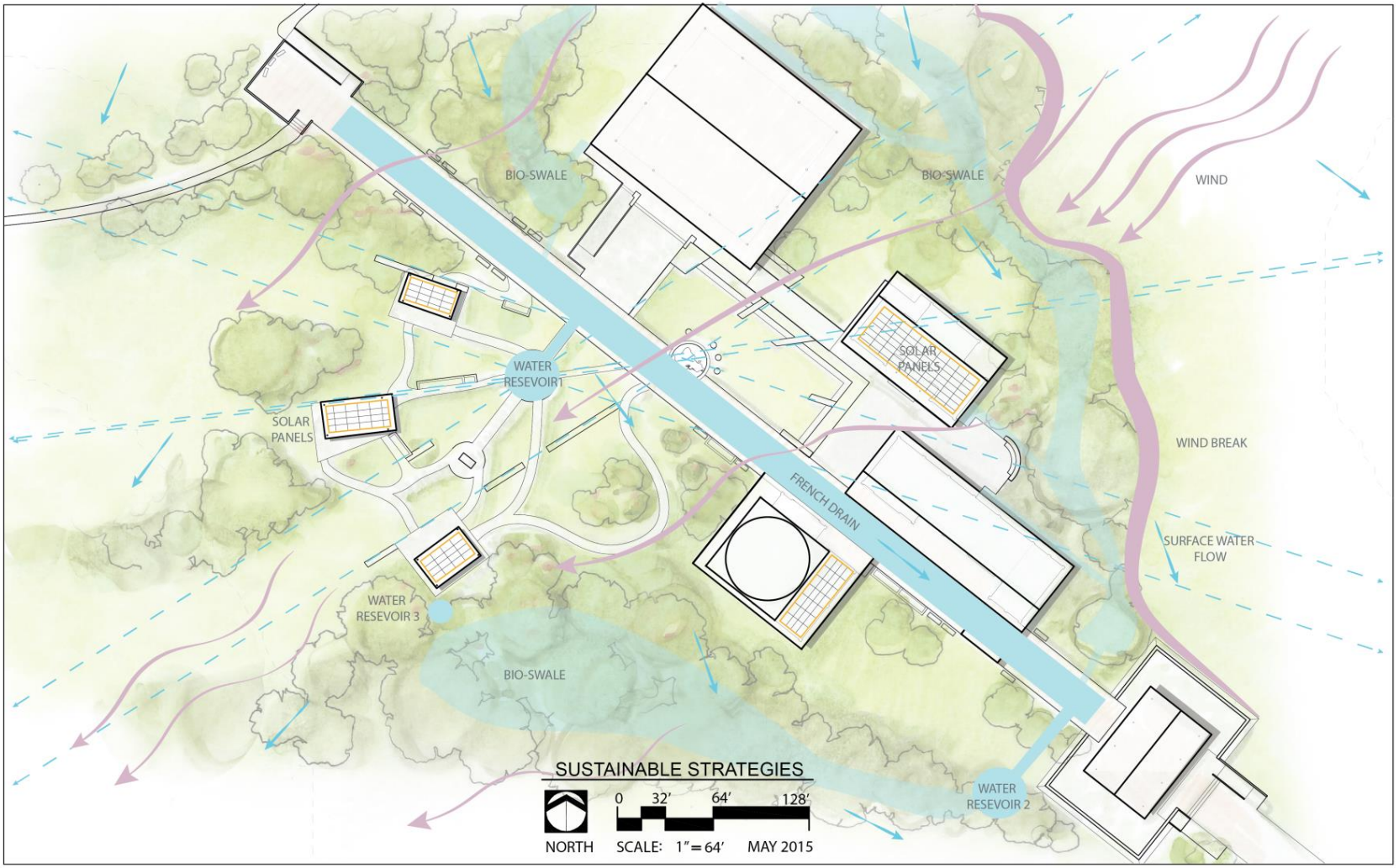

Figure 38: Sustainability Strategies Plan.

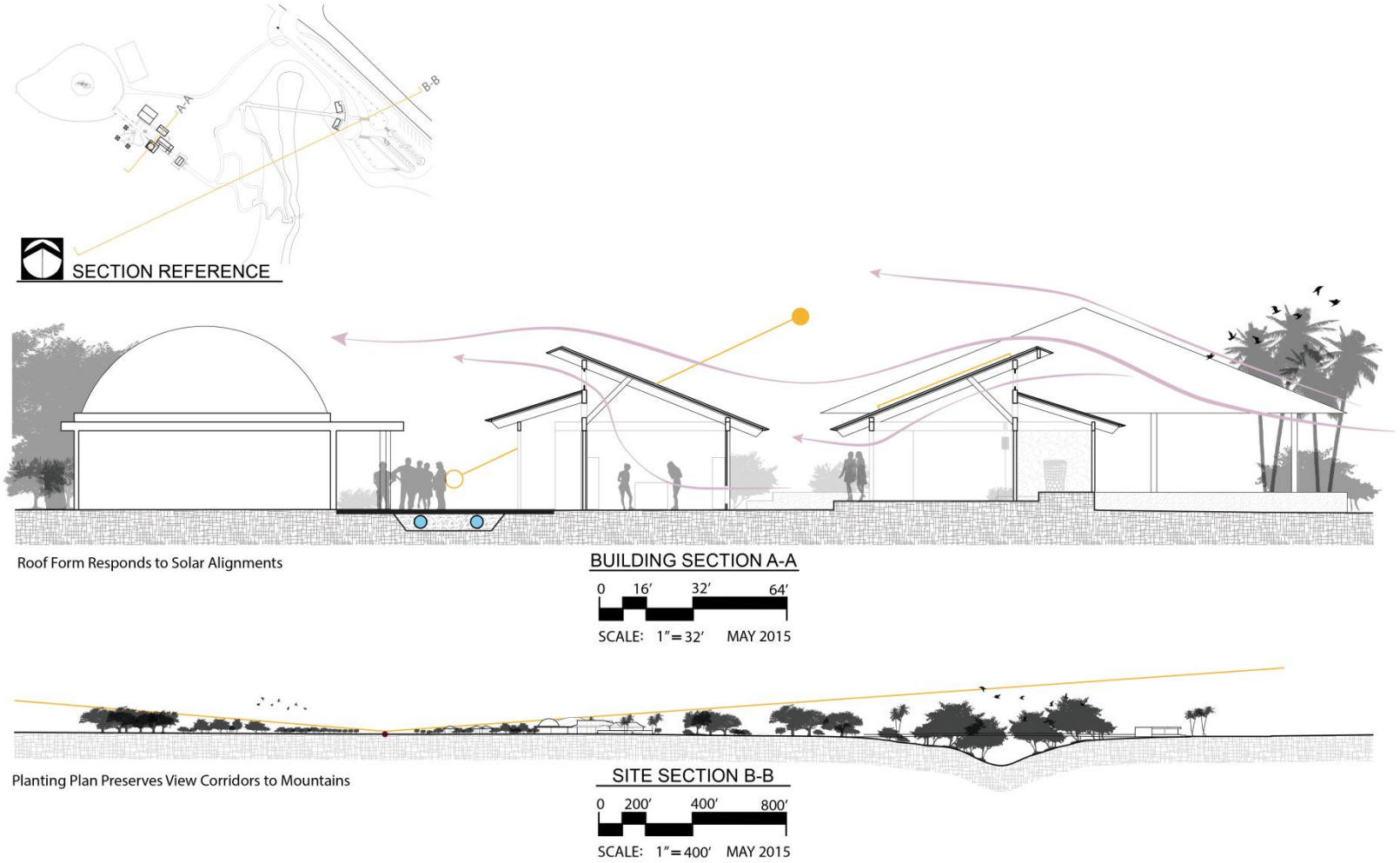

Figure 39: Building section and site section.
(Shows how the architecture and landscape respond to preserving the views of solar alignments and landscape markers.)

EDUCATION 8: OBSERVATION PIER, FINAL KAHEA

At the termination of the alignment axis, prior to entering the area of the stones, there is an observation pier. Here, permission to enter is part of cultural protocol. This is designed to codify yet another level of respect. From here, with the stones in the distance, viewers can get a glimpse of what the sacred site felt like (Figure 41). The area expands into an open landscape. Rings of ti plants mark the inner circle around the stones. The journey could possibly end here if visitors sense the immense power of the site. However, there is a guided pathway for those who want to go further. Figure 40 illustrates the guided path for viewers to see informational boards located at key points around the site.

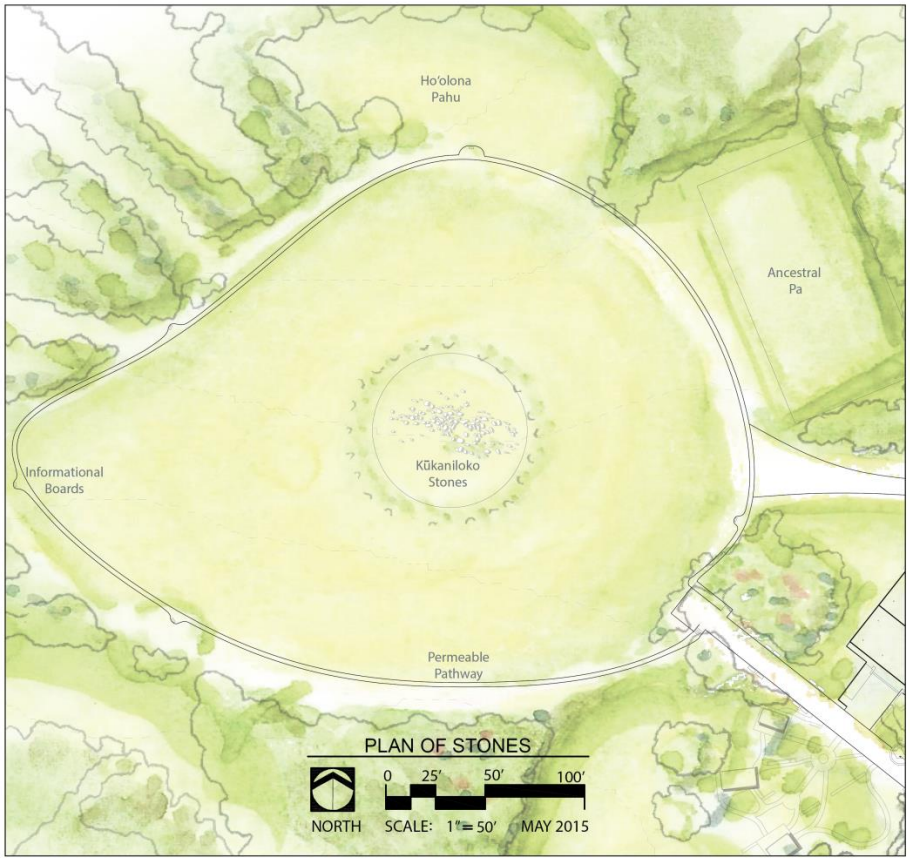

Figure 40: Plan of inspiration space

The pathway proceeds to enter the sacred area. It is customary that when entering the site, one must acknowledge the ancestral families. To do this, one circumambulates around the stones in a counterclockwise direction. Informational signs

are located at key points around this path that explain about celestial alignments, Hoʻolona Pahu Heiau, and the Ancestral Hula Pa. The pathway then returns to the pier. Stepping off the pathway onto the grass is left up to the visitor but also managed by the cultural tour guide. This is reserved only to those with a connection to the site. When leaving the stones, one makes their way back through a cultural center and returns through the cultural landscape to the site exit.

Figure 41: Hoʻomana Envisioned[209]

6.7.3 CONNECT

To enable a meaningful connection between man and nature through architecture, the design of the experience must encourage an intimate connection using multiple parts of the brain. Connections are made with visitors who are now educated in

[209] "Kahu image." Accessed Sept. 9, 2014, https://www.facebook.com/kai.markell/photos
"Kahu base image." Accessed Sept. 9, 2014, http://jasonmatias.com/wp-content/uploads/2013/11/Kukaniloko-Monk-2-1024x681.jpg

Hawaiian moʻolelo, familial connections to natural cycles and empowered with mana from visiting a wahi kapu. By looking to our past, we are guided in the future. This is wa ma mua.

The connection to mana is built through the gradual revealing of knowledge from the time the visitor first turns into the driveway until their final viewing of the stones. The visitor thus acquires knowledge in a subliminal way. The acquisition of knowledge occurs in the experience of light, touch, and sound.

CONNECT 1: THROUGH SOUND

The journey through the native forest is done so upon a path of crushed gravel, where one can hear their footsteps and become are aware of their presence. As they enter the cultural center, they traverse an elevated wooden boardwalk which highlights the axis between the hale and the observation pier. The wood softens the sound of their footsteps and allows for the sacred ground to flow underneath. When stepping off the axis to enter the ancillary buildings, one will traverse stone pathways where one must be conscious of the steps they take. The open grass surrounding the stones softens the steps even more so that visitors are only aware of the presence of the stones.

CONNECT 2: THROUGH LIGHT

The visitor transitions from dark to light as they make their way from the native forest to the stones. Under the flickering light of the canopy the visitor experiences choreographed exposures to luminosity. As they make their way through the center, the buildings transition from light to dark. The information center is lit from skylight coming through clearstory windows that fills the information boards with ambient natural light. The observatory and hale pahu are subdued in darkness as they demand a sense of calm, quiet and focus. The open sided halau allows for cultural activity to be seen under the protection of a shade. The area around the stones is open, with little canopy; thus allowing for an opportunity to bathe in light and perhaps experience hōʻailona (natural omens).

CONNECT 3: THROUGH MATERIALS

The architecture of the cultural center displays a transition of materials. The exteriors of the buildings start off raw, with bush hammered concrete sidewalks, stone veneer foundations, exterior ʻohia posts, and detailed polished finishes on the inside. The psychology of material choice shows how the building can be refined and highly intellectual on the inside while still blending seamlessly with its exterior surroundings.

CONNECT 4: THROUGH DESIGN

The design of the Kūkaniloko cultural center allows for visitors, from multiple backgrounds, to experience culture in an authentic manner. Visiting a site of such cultural significance, in any culture requires respect. This respect is embedded in the design by creating distance between the secular and the sacred, efforts of incorporate multiple educational opportunities, and the architecture using traditional methods of construction to make modern forms the idea of evolution and respect to past is built in to the design.

The role of the architect is to create a design that encompasses natural processes, cultural and social influences, materials and systems that complement the project vision. The iterative design process of integrating cultural concepts, participatory planning and incorporating community input is vital for successful design in Hawaiʻi, especially significant sites. Hopefully, the Mamo Process will be envisioned in many locations, by many cultures, and designing in this manner will allow people to see intimately the uniqueness of site. Through architectural site intimacy the site speaks, "in to me you see."

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APPENDICES

A1: APPLICATION MATRIX

Design application broken down by living building challenge petal and relative to Hawaiian cultural influence at Kūkaniloko.

Living Building Challenge: Hawaiian Equivilent: Kukaniloko									
LBC Petal	**LBC Intent**	**LBC Imperative**	**Hawaiian Value**	**Hawaiian Principle**	**LBC Steps**			**Kukaniloko**	
Site (Wahi)	Where to Build; How to Protect/ Restore; Pedestrian Base And Supported by Local/Reginal Agriculture	Limits To Growth	Aloha Aina	Kapu System Traditionaly Protected the Site.	Protection against Development of Sensitive Areas	Wetlands	at least 15 meters, and up to 70 meters12 of separation property line boundaries		Access Management To Maintain the Sanctity of the Cultural Site
			Malama Aina						
			Land is Cheif; Man is Servant	Palena:Boundaries		Primary Dunes	at least 40 meters of separation		
L2. Rural Agriculture Zone				sensitive ecological habitat		Old-Growth Forests	at least 60 meters of separation	exception due to primary purpose is mitigation	On Site Landscaping Emulate Density and Biodiversity of Indigenous Ecosystem: Reforestation Effort & Creek Restoration
sensitive ecological habitat						Native Prairie	at least 30 meters of separation	Restore	
Building Typology. & Landscape typology				Palena:Boundaries	Prime Farmland	Restoration of Traditional Farm Land	exception for a project that is part of an existing historic community developed prior to 1945, or in a neighborhood that meets the density threshold of Living Transect L5 or L6.	Modern Needs	Reforestation, Agroforestry, Permeculture: Estimated $396,000 year Rev.
Pre Condition: Expansive Landscape abondoned pineapple agriculture					Within 100yr Flood Plain			Flood Map, Landscape Plan, Landscape Narrative	
		Urban Agriculture		Ike Papalua: extra sensory perception	Compacted Communities			View Corridors Preserved	Increase Cultural Awareness. appropriate connection to outdoors. indigenous, endemic to Hi, Food (utility) scaping
				Incorperating nature/ familial cycle set	Integrated @ Appropriate Scale (FAR)	On-site landscape must emulate the functionality of indigenous ecosystems with regard to density,biodiversity, plant succession, water use, and nutrient needs. This does not mean that project sites must eventually revert to their original, pre-development state; rather, the intent is for project sites to be native or naturalized systems which are maintained to encourage rather than limit increasing complexity. Invasive species must be removed and/or addressed in a long-term plan.		(Floor Area Ratio ≤ 0.09)	Hoomana the Aina: Nature Brought Back
								80% Project area used for food production	
				Going Back to Nature				products of the agriculture must be harvested and either used or distributed for use.	
		Habitat Exchange Program		Lokahi: Balance	Decentralized Nature	1 Hectare Development (2.47 acre) = Set Aside Perpetuity of Habitat Away	0.4 hectare min offset (.9884 acres)	Provide opertunity to restore native biota	Working Together Possibly with Other Urban Projects to do something right and Restore Aina
				Pono: Do what is Right					
		Human Powered Living			Car Free Living: Encouraged Foot Traffic throughout Parcel	People Powered	Pedestrian-Oriented Optimized when all 3 Present	Grow, Live-Work, Teach All at One Place	Agriculture, Job Creation, Education Opportunity
						Shared Transit	Residential	n/a	
							Light Industry	On Site Food Production, Furtilizer Composting	Self Sufficient Program
							Commercial	bike storage up to 15% of occupants at admin center	Commercial Space
									Educational Space
									Gather Spaces
		Human Attitude		ke eo o ka aina: the spirit of the land	Ideal Condition	Value Second Hand Site > Untouched Sites	Rehabilitating Access Road and Trails	Partnership with State: Access Road for Dual purposes. Emergency Fire Roads and Wind Breaks	Building Location takes advantage of Topography, Water Cycles, Surround Landscape Alignments
				He Waa He Moku; He Moku He Waa	Current Limitations	Pioneer Mindset	Terrace Production	Reinstating Farm Land Production; Rather than constructing new	Preserve Resources

Living Building Challenge: Hawaiian Equivilent: Kukaniloko									
LBC Petal	**LBC Intent**	**LBC Imperative**	**Hawaiian Value**	**Hawaiian Principle**	**LBC Steps**			**Kukaniloko**	
Water (Wai)	Realign Use of Water; Redefine "Waste" in Built Environment. To meet all water demands within the carrying capacity of the site and mimic natural hydrological conditions, using appropriately-sized and climate-specific water management systems that treat, infiltrate or reuse all water resources on-site.	Net Positive Water	Lokahi	kanawai/ auwai/	Harvest	Rain Catchment		Rain Catchment/Fed Systems . wash feet /vehicle station	Hoomana the Ecological Condition of the Site: Preserve Resources
						Natural Closed Loop Systems			
					Purified	Challenge Existing Technology		rain for toilets and drinking or landscape use	
						NO Added Chemicals		Loi Filtration System Benefits Stream and Crops	
					Recycled	Outdated Attitudes		EPA maintainence	Agriculture terracing
		Ecological Water Flow	aloha	enviornment + people pili	Storm and Used Water Managed Onsite	Internal Demands	Infiltration: Show that both shallow and deep infiltration have been investigated and utilized to the greatest extent possible.		
				pili aloha/ hoa aloha		Adjacent Site	Time-scaled surface flow	Storm Water Catchment + Reuse System	bioremediation
							Groundwater Recharge	native plants allow quicker transfer of water to ground to refill aquifers	
							Agriculture Use		
				aloha kekahi I kekahi			Other Adjacent Property Needs		mindful of neighbor: Control Runoff Amounts
		Based on Carrying Compacity of Site		efficiency;think for future use					gather and grow own supplies

Living Building Challenge: Hawaiian Equivilent: Kukaniloko									
LBC Petal	**LBC Intent**	**LBC Imperative**	**Hawaiian Value**	**Hawaiian Principle**	**LBC Steps**		**Kukaniloko**		
Energy (Ikehu)	Pollution Free, Solely Renewable; Safe, Reliable, Decentralized Power Grid: No Combustion	Net Zero Energy	waste not want not		Prioritize Reduction		Solatube LED Lights	Star Solar Fans	Solar thermal and PV Performance
					Optimize Technology		PV Shingles	Efficient Bulbs	
					Additional Comments		Vertical Axis Turbine Hidden in Coconut Tree Trunk in proximity of Roadways	night activities, sprinklers	connection to outdoors: operable glass doors wind sheltered courtyard: outdoor learning classroom

Living Building Challenge: Hawaiian Equivilent: Kukaniloko									
LBC Petal	**LBC Intent**	**LBC Imperative**	**Hawaiian Value**	**Hawaiian Principle**	**LBC Steps**	**Kukaniloko**			
Beauty (Ho'onani)	Precurser to Preserving, Conserving, Serve Greater Good; Celebrate Design That Creates Transformative Change	Beauty + Spirit	Kuleana	Connect to history of land, people, future vision: responsible living: wise use of resources	designed for human delight	a finite resource with sustainable resources, that if used wisely can carry us into the future, while enriching people's lives with the inspiration of the building design	Open views, passive ventilation and ample passive lighting enhance the experience for occupants, while connecting them with the beauty of this tropical island	Connections to Technology: wifi. & Connections to Nature	Connection to Modern and Traditional Economic Drivers
					Celebrate Culture	connections to the land (the ancient Hawaiian field system is visible through open windows on all sides), a connection to history (these spaces were once the breadbasket for a thriving society) and connection to the future in our vision for wise use of resources and responsible living.		building ammenities/ structural components/ Heirarchies to space (ie. Hawaiian Concepts),	enables occupants to feel part of the environment, apealling to being outside; landscape design
					Spirit of Place Appropriate to Function	south facing for solar energy, exposed to strong trade-winds for wind power and passive ventilation, adjacent to a sustainable agriculture restoration project, and the only disturbed site on the campus, preserving the natural beauty of the land.		building ammenities/ structural components/ Heirarchies to space (ie. Hawaiian Concepts),	apealling to being outside; landscape design
		Inspiration + Education		Ike (sense of place)	About the Operation	Conservation is a meta-message of the building, leading students to increased awareness of the potential for conservation in the zero energy, zero water and zero waste facility		Agriculture, Hawaiian Art	Successful Solutions + Motivation for Change
					About the Process	Protocol and Opportunities for Humbling the Mind. The meandering pathway educates through subtleties along the way		history of significance. (general and site specific), low land mesic forest	
					Function as a School	learn in the new ways, and teachers to teach in new ways			

Living Building Challenge: Hawaiian Equivilent: Kukaniloko									
LBC Petal	**LBC Intent**	**LBC Imperative**	**Hawaiian Value**	**Hawaiian Principle**	**LBC Steps**			**Kukaniloko**	
Health (Maoli Ola / Moomehau / Mookuauhau)	Address Major Conditions: Decreased Comfort = Increased Env. Impacts	Civilized Environment	e hoo malamalama hou ka mauli ola. Hoola Hou	health of Hawaiian Culture, Spirituality, Stems From Geneological Ties to Land	Thermal Control	Operable Windows: Must Provide	Fresh Air	automated louvers & exhaust fans	The buildings are entirely naturally ventilated. Building automated louvers maintain temperature and relative humidity levels to maintain interior comfort. If necessary, exhaust fans are activated to induce airflow
							Daylight	Foot Candles, Glare, Views	
					Healthy Air	Entryway	External Dirt Track-In System		
							Internal Dirt Track-In System		
						Separate Ventilation and Exhaust	Kitchen	Outdoor Kitchen	
							Copy Room		
							Bathroom	separately exhausted toilets and janitor closet rooms	
							Janitorial Closets		
							Chemical Storage		
						Ventalations	ASHRAE 62 compliant		air changes per hour, operable windows in every space, operable window area is 19% of the total floor area, compliant with Title 24 prescribed air change per hour requirements
							Monitor:	Carbon Dioxide (CO2)	
								Temperature	
								Humidity	
						No Smoking		no smoking signs	
						Testing	At Pre-Occupancy		Respirable Suspended Particulates (RSP), Total Volatile Organic Compounds (TVOC)
							At 9 months		
				Ike Papalua. Piko Ekolu. Spiritual Visualization, Analysis. Three thought sources	Biophilia: Visual Comfort	Environmental Features	Papa Makawalu: Lololo/ Application of Kaona	Cultrually Appropriate Mitigation: Native / Indeginous RePlantings:	Nurture Innate Human Attraction to Natural Systems and Processes: Polycarbonate skylights, wood sun screens, and interior roller shades all work together to introduce, reflect, and control natural daylight. Satisfy foot candle minimums, tackle glare, and enhance views, resulting in a pleasantly lit interior environment.
						Natural Shapes and Forms	Ka Aina, Ke Kai, Ka Lewa: Three Stratums of Atmosphere: all are interconnected. rejuvinate land nuturing practices. Restoring the life of the land.		
						Natural Patterns and Processes			
						Light and Space			
						Place-based Relationships	(Ike Kuuna.)(Inherent) Ancestral Knowledge, understood through experiecnces. man is servant land is chief		
						Evolved Human-Nature Relationships			
					Maintenance			maintenance access ways, building access panels for maintenance	

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Materials (Kino)	non toxic, transparent and socially equitable To eliminate the use of worst-in-class materials/chemicals with the greatest impact to human and ecosystem health. • Alkylphenols • Asbestos • Bisphenol A (BPA) • Cadmium • Chlorinated Polyethylene and Chlorosulfonated Polyethlene • Chlorobenzenes • Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs) • Chloroprene (Neoprene) • Chromium IV • Chlorinated Polyvinyl Chloride (CPVC) • Formaldehyde (added) • Halogenated Flame Retardants (HFRs) • Lead (added) • Mercury • Polychlorinated Biphenyls (PCBs) • Perfluorinated Compounds (PFCs) • Phthalates • Polyvinyl Chloride (PVC) • Polyvinylidene Chloride (PVDC) • Short Chain Chlorinated Paraffins • Wood treatments containing Creosote, Arsenic or Pentachlorophenol • Volatile Organic Compounds (VOCs) in wet applied products	Red List			Exceptions		BioBased 501w foam insulation with water-based agents	Unfortunately contains required flame retardants, which were required by building code.
		Embodied Carbon Footprint							
		Responsible Industry	Hoolohe I na kupuna:	Listen to Kupuna to inform	Certified Resource Extraction	Stone	Culturally Charged Materials. Construction materials and type informed by ahupuaa specific		Historical (accurate) baseline: What was there/ What was used
						Rock			
						Metal			
						Minerals			
						Timber	Forest Steward Council (FSC)	I12-E1 8/2008 Intentional Harvest part of invasive control, harvest was minimally invasive, used in structure	Maintain/Restore Onsite Bionetwork: Project used glue for laminated beams that does not contain urea formaldehyde, but does contain PRF
							Salvage Sources		
							Intentional Onsite Harvest		
		Appropriate Sourcing	Pono	Protocols in resource gathering	Place-based Solutions			Where are Composting Toilets Made???	Aid Reginal Economy
					Max Distance Matrix				
		Conservation + Reuse		Pono	Material Conservation Management Plan	Design Phase	Appropriate Durability Specifications		
						Construction Phase	Optimization and Collection of Wasted Materials		
						Operation Phase	Collection Plan: Consumables and Durables		
						End Life	Adaptable Reuse and Deconstruction		
					Reduce Waste	Diverted Waste Matrix	Metals 95%		
							Paper/Cardboard 95%		
							Soil/Biomass 100%	On site reuse of left over planting materials: cut/fill soil	
							Rigid Foam, Carpet, Insulation 90%		
							Other 80%		
						On Site	Collection of Recyclables and Composting Food Scraps		

Living Building Challenge: Hawaiian Equivilent: Kukaniloko									
LBC Petal	**LBC Intent**	**LBC Imperative**	**Hawaiian Value**	**Hawaiian Principle**	**LBC Steps**			**Kukaniloko**	
Equity (Pono)	Foster Sense of Community; Protect and Restore Natural Environment; Equitable Access to all People: abilites, age, socioeconomic status	Human Scale + Human Places	Ho'ihi/ Lokomaikai respect for all things/ kindhearted to all things	Anana System based off human proportions Cultural, Human Scale	Promotes Culture and Interaction	Paved Area Area	Surface Cover Max 7mx10m		
						Street/Block Design	Street Widths		Cultural Human Scale
							Pedestrian Strips/ Planting Median		
							Sidewalks	Pathways Preserve Ecological Flow	
							Distance Between Trees	Rock Walls: Boarders	
							Max Dist. between Circulation Routes		
							Max block Size		
						Signage Scaled to Liveable Places	Quantity	Central Education Centers	Education of Community
							Dimensions	Highlight Natural Landscape Not the Sign Itself	
							Elevation	Educating Youth-Kupuna	
						Proportion	Max Distance Between Facade Openings	Scaled for Stewardship Management	Simple Stuctures Preserve Views/Vistas from eye Level perspective
							Max Footprint		
		Democracy + Social Justice	Ha'aha'a	Humble oneself, realize ones role as a small element within the environment	Age				Kupuna Design
					Socioeconimic class	street furniture		Program Access/ On Site Seating	
						affordable housing		n/a	
		Rights to Nature			Privatized Access	Beaches		Encourage/Promote Outdoor Access/Lifestyle Welcoming Pathways, Landscaping, Views	
						Waterways			
						Wilderness Areas			
					Multi Functional And Protects Health of People and Environment	Fresh Air	protect emissions		natural ventilation
									red list free
						Sunlight	not block adjacent facades, rooftops		Max Shade matrix
						Waterways(ocean, rivers, wetland, pond)	no restricted access		
							no assumed ownership of water		
							60m must provide access ped. and bike		don't compromise quility or quantity downstream

A2: VOCABULARY LIST

Hawaiian	English

A	
ʻāina	1. Land 2. place of food
ʻaikanaka	Name of Cheif
ʻaikapu	sacred eating
ʻauhau	tax
ʻaumakua	ancestral guardians
ʻauwai	irrigation ditches
ahu	altar
au	waves
ahupua'a	sector of land
akua	gods
aliʻi	chief
ali'i aimoku	highest chief who governs the land and a trained military tactician
aliʻi nui	high chief
aloha	to love unconditionally without expectation
aloha ʻāina	to maintain an intimate relationship with the land and all of its interactive elements. Loving the land as a family member
aloha kekahi i kekahi	to care for another with love and kindness without the expectation of compensation.
apaʻa	the land begins to become hard
apana	pieces

E	
e noʻonoʻo hawaiʻi	Think Hawaiian

H	
haʻahaʻa:	humility
ha'aheo	pride
hai	sacrifice
haku a lewa	just above the ground which a person stands to the bottom of a tree
haku ʻohana	eldest male
hala	*thatch screw pine, Pandanus tectorius*
hale	house
Haloa	First Hawaiian
haloanakalaukapalili	Eldest brother, still born
hau	sea hibiscus)(*Hibiscus tiliaceus*
hāpai	pregnant
hawaiʻi	Island
heiau	temples
hei hei	to catch
hekili	thunderstorms
hiʻiaka	Pele Sister
hoa	1. (n) Friend or companion. 2. (nvt.) to tie or bind. 3. (nvt.) to strike with a club 4. (n) Similar in meaning to the *mamo*
hoa aloha	close friend
hōkūleʻa	"Our star of gladness",
hoʻohōkūkalani	Daughter of Papa and Wākea
hōʻihi	respect all things
hula	dance
huli	crown of the kalo plant
holoholokū	birthing site at Waialua on the island of Kauaʻi
hoʻoilo	winter season, November to April
hoʻomana	empowering
huinakolu	the navigator's triangle
hoi	to return

I	
ʻihiʻai	(yellow wood sorrel)(*Oxalis stricta*
ʻike	knowledge
ʻikepapalua	deeper "supernatural" understanding
ʻili	small parcel of land
ʻilima	*Sida fallax*
'ili ahi	All Hawaiian kinds of sandalwood (*Santalum spp* .),
inoa	name
ipu	gourd) (*Lagenaria siceraria*)
iwikuamoʻo	Backbone

K	
kahakai	shoreline
kahiki	Tahiti
kahuna	priest
kai	ocean
kaiona	goddess
kalana	county
ka lani paʻa	realm of the sun and stars
kalo	*Colocasia esculenta*
ka lupe o kawelo	The Kite of Kawelo; Great Square of Pegasus
ka makau nui o māui	Scorpio
kamaka ku i kahi lewa	the sky just above the zenith
kamaoha	goddess
kamapuaʻa	demigod
kāmole	(primrose willow)(*Ludwigia alata*
kamohoaliʻi	Older brother of Pele
kānāwai	belonging to the water; Law
kanaka	human beings
kānehekili	Pele sibling; spirit of thunder
kaona	multifaceted meaning
kapa	the people of old
ka paʻa i lalo	earth and the soils below
ka poʻe kahiko	Pele sibling; spirit of explosion
kapohoikahiola	Pele sibling; spirit of explosion
kapu	taboo
kau	summer season, May to October
kauila	tabu incident to the dedication of a heiau
kau hale	Housing Complex
kea au ulu	highest stratum of the clouds
keiki	children
ke ka o makaliʻi	The Canoe-Bailer of Makaliʻi
ke a po a lewa	ring of space above Earths' atmosphere
ki	ti plant
kilo hoku	school of ancient thought
kilokilo	foreseers
kinolau	physical manifestation
kipuka	1. Variation or change of form (puka, hole), as a calm place in a high sea, deep place in a shoal, opening in a forest, openings in cloud formations, and especially a clear place or oasis within a lava bed where there may be vegetation
koa	1. The largest of native forest trees (Acacia koa), 2. warriors
kōkua	offer and provide aid
ko kula uka	upper plains
ko kula kai	lower plains
konohiki	appointed head of ahupuaʻa

kou	kou (kerosene wood)(*Cordia subcordata*)
kū	god of war
kua hea	first belt of small trees stunted by high elevation
kua hiwi	backbone, central peaks or ridgelines of the island
Kualiʻi	Name of Chief
kua lono	broad plateaus between peaks and ridges
kua mauna	belt connecting the side of the mountain with a rounded swell topography
kua pele	craters
kuhikuhipuʻuone	architect
kūkaniloko	the sound that resounds from within
kukui	candlenut tree (Aleurites moluccana), a light
kula	cultivatable lands
kuleana	a bonding responsibility
kumu	teacher
kumulipo	creation Story
kūpuna	grandparents
kūʻula	god associated with fishing shrines
kuʻulakai	Hawaiian fishing god
kupkupu ferns	Sword fern (Nephrolepis exaltata),
L	
laʻau lapaʻau	Medicinal Plants
lāhui	hawaiian people
lama	*Diospyros, synonym Maba*
lauhala	*Pandanus tectorius*
lauae	*Phymatosorus grossus*
laulima	working together
lewa hoʻo makua	contact with the earths' surface
lewa lani lewa	where small birds dwell in the top of the trees
lewa lani lewa	highest stratum of space above the clouds
lewa nuʻu	where large birds fly and clouds move
līhuʻe	flat kula lands
loʻi	taro patches
lōkahi	working harmoniously in a unit
loko iʻa	fish pond
lokomaikaʻi	kindhearted way of being
lono	god of agriculture
lower luna aku	above trees
luakini	type of heiau
lua	1. two 2. second hieghest cloud realm
luna aʻe.	just above the head
luna lilo aku	lowest cloud realm
luna lilo loa	second lowest cloud realm
luna o ke au	
M	
mahele	division
makaʻainana	malo
makahiki	traditional new year
makani	wind
makua	parent
makuahine	mother
makai	toward the sea
malo	male's loincloth
malama ʻāina	to care for
mamo	1. (n) Black Hawaiian honey creeper (Drepanis pacifica): its yellow feathers used in choicest feather work. Endemic to Hawaiʻi, extinct in the 1880s. 2. (n.) Safflower or false saffron (Carthamus tinctorius): a yellow flowering plant, also found in Asia. 3. A sergeant fish (Abudefduf abdominalis): yellow in color. 4. (n.) Descendant, posterity or child
mana	spiritual power
manaiakalani	The Chief's Fish line
maoli	Native, indigenous
maui	Island
mauka	toward the mountain
mele	song
moku	1. cut off 2. word for island
moku kele i ka waʻa	islands easily reached by canoe
moku o loko	interior divisions
Moʻolelo	stories
moʻo kūʻauhau	genealogy
moʻo	1. guardian 2. succession, story
N	
namako o kahaʻi	Pele sibling; goddess of sea and water
naupaka	*Scaevola coriacea*
neke	(maiden fern)(*Adiantum pedatum*
nēnē grass	Same as ʻai-a-ka-nēnē, a plant. (Neal 803.)
niu	(coconut)(Cocos nucifera
noni	Indian mulberry
O	
ʻoha	sprout or bud
ohana	family unit
Oʻahu	Island
ʻohe	bamboo; Schizostachyum glaucifolium
ʻōlelo noʻeau	traditional proverbs
ʻōhia lehua	*Metrosideros polymorpha gaud*
ʻolelo	language
oli	chant
oʻo	stick
P	
pa	spaces
pae-ʻāina	cluster
pahu	drum
pali hāinu kai	a wet sea-cliff
paliuli	legendary land where the aliʻi children were raised
palua	dualism
pana	particular moment in time or location
Papa	Earth Mother
papanuihanaumoku	realm of reproducers
papahulihonua	realm of the earth
papahulilani	realm of the heavens
pele	goddess
pelehonuamea	Pele of the sacred land
peleʻaihonua	Pele the eater of land
piko	navel cord,
piko poʻo	past
piko ʻewe	present
piko maʻi	future
pili	*Heteropogon contortus*
pule	prayer
pōhaku	stone
pohinahina	*Heliotropium anomalum*
poko	sometimes personal land of chief
pono	righteous; doing the right thing, at the right time, for the right reason, without expectation of compensation.
poʻo	head of household
puʻuhonua	place of refuge

W	
wa	noise
waʻa	canoe
wahi	place
wahiawā	place of noise
wahine; wāhine	women; plural
wahi Pana	legendary places
wai	water
waiwai	wealth
waihau	type of heiau
Wākea	Sky Father
wao	natural wild forest, larger tree forest
wao akua	realm of the gods
wao kanaka	realm of man
wao kele	rain forest
wao laʻau	realm of plants
wao maʻukele	where the biggest trees grew
wiliwili	*Erythrina sandwicensis*
U	
ʻuala	(sweet potato)(*Ipomoea batatas*
uhiuhi	An endemic legume (*Mezoneuron kauaiense*),
ʻula	red